

# SCUBA DIVING

NEW REGS  
P 45

SPECIAL  
ISSUE

**NUCLEAR**  
TECHNICIAN

**CROC**  
WRANGLER

**CRIME**  
INVESTIGATOR

**DANGEROUS**  
**JOBs**

DEADHEAD  
**LOGGER**  
**SATURATION**  
DIVER

P 26

# You Make the List...

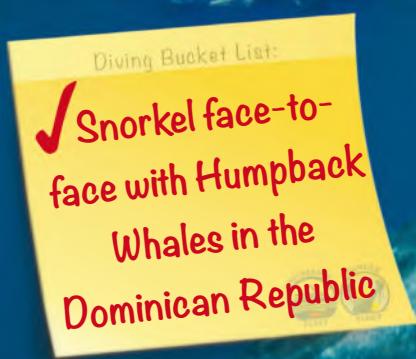


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**ON THE COVER**  
Criminal investigator Michael Berry stands at the Appomattox River in Virginia.  
PHOTOGRAPH BY MIKE MORGAN

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### David Fleetham   Hawaii

David grew up in Ontario, Canada just outside Toronto and in his last year of high school learned to scuba dive in a man-made lake. Soon after he purchased an Ikelite housing and a Minolta SLR camera, started working in the dive industry, and focused on his passion: underwater photography.

Since then David has become one of the most published underwater photographers in the world. He now has over 200 magazine covers under his belt, including the only underwater image ever to be used on the cover of LIFE magazine. David's philosophy is to shoot what you love, and try to capture it in a way that is unique to you.



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# TALK

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## IT'S A DIRTY JOB

Here in *Scuba Diving*'s office in Winter Park, Florida, our idea of a dangerous dive job is when we have to lug our gear through five airports on our way to some exotic locale. In fact, when we meet divers while we're on assignment — in Raja Ampat, Palau, the Red Sea, the Maldives or some other awesome dive spot — we often joke that it's a dirty job, but someone's gotta do it.

All kidding aside, we know there are necessary jobs that divers perform. A few years ago, we profiled four divers who worked as commercial divers, including a water supply diver and a polar ice safety diver ([scubadiving.com/](http://scubadiving.com/)

**training/basic-skills/dangerous-diving-jobs**), and the popularity of this feature led to the creation of our regular column *What It's Like* (page 24). This column opened our eyes to just how many commercial-diving

and hazardous dive career choices there are. We've published first-person accounts about saturation diving, shark tagging, military missions, golf-ball recovery and explosive-device clearance expeditions.

They've proved to be popular, so we asked Travis Marshall, *Scuba*'s former training editor and a frequent contributor, to find a few unique dive-related jobs and profile the divers who choose those hazardous careers. The result is *The World's Dirtiest Dive Jobs* (page 26), where you'll meet nuclear-reactor diver Kyra Richter, underwater criminal investigator

Michael Berry, saturation diver Brian Lacey, dead-head logger John Clayton and crocodile wrangler Richard Bolter.

Some of the hazards these divers face are obvious, but some are not. The training is intense (see the *Are You Ready for a Diving Career?* column on page 35) and requires a calm, focused demeanor, and often, a tec-diving skill set. We think you'll find their stories compelling. They've certainly earned our respect.

— PATRICIA WUEST,  
EDITOR-IN-CHIEF



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THE ORIGINAL



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## LETTERS

### REEF RECOGNITION

I always love your ScubaLab section. As an avid diver, I love to see and read about new equipment. I enjoyed the one on knives [March/April], as I just happen to be in the market for one.



FROM LEFT: HOWIE GRAPEK; CHELSEA POMALES, OPPOSITE: JON WHITTLE

Also, one suggestion: As we divers are all concerned about our reefs, and protecting and nurturing them, I suggest doing a monthly section on any new artificial reef being "put down." Most of us know

about what is already there, but we are not fully aware of what's new. This month, in Deerfield Beach, Florida, they are putting down the "Rapa Nui" artificial reef. I am sure your readers would love to read and "sea" about it! — PAUL STRUZZIERO, LIGHTHOUSE POINT, FLORIDA

*Thank you for writing, Paul. We thought of you after hearing the disappointing news about the setback in sinking the Rapa Nui (see page 14 for the full story).*

*We are sending you a Mares X-Vision LiquidSkin mask for your letter and suggestion, and we will keep you and all of our readers posted on the status of Rapa Nui Reef: Round Two, and try to keep current on reef creations worldwide.*

### SERENDIPITOUS SCUBA DIVE

Wow — talk about a coincidence. Your March/April issue was an omen to my activities at the end of May. My son was finishing up his freshman year at Alabama, so I decided to fly down with our dive equipment and make a side trip to Pensacola to dive the *Oriskany* before we headed back to Connecticut. We decided to dive at H20 Below with Capt. Douglas. He was great. I had an equipment issue, and he was very quick to help out. On the day we went out, the boat had some

guys from Seal Sports doing rebreather training. My son and I spent some time talking with them about the equipment and the training. It was fascinating. But the coincidence that we dived with Capt. Douglas on the *Oriskany* and with a group of rebreather divers just seemed almost eerie given the March/April issue had articles that mentioned all three. *Scuba Diving* magazine offered great insight to these topics, and a few weeks later we experienced them up close. Really enjoy the magazine. — RANDALL LOVORN, NEWTOWN, CONNECTICUT



WIN THIS

Tell us about your dream dive job — or anything else in this issue — for a chance to win this Mantis mask from IST Sports. Write us at [edit@scubadiving.com](mailto:edit@scubadiving.com) or post to our Facebook wall.

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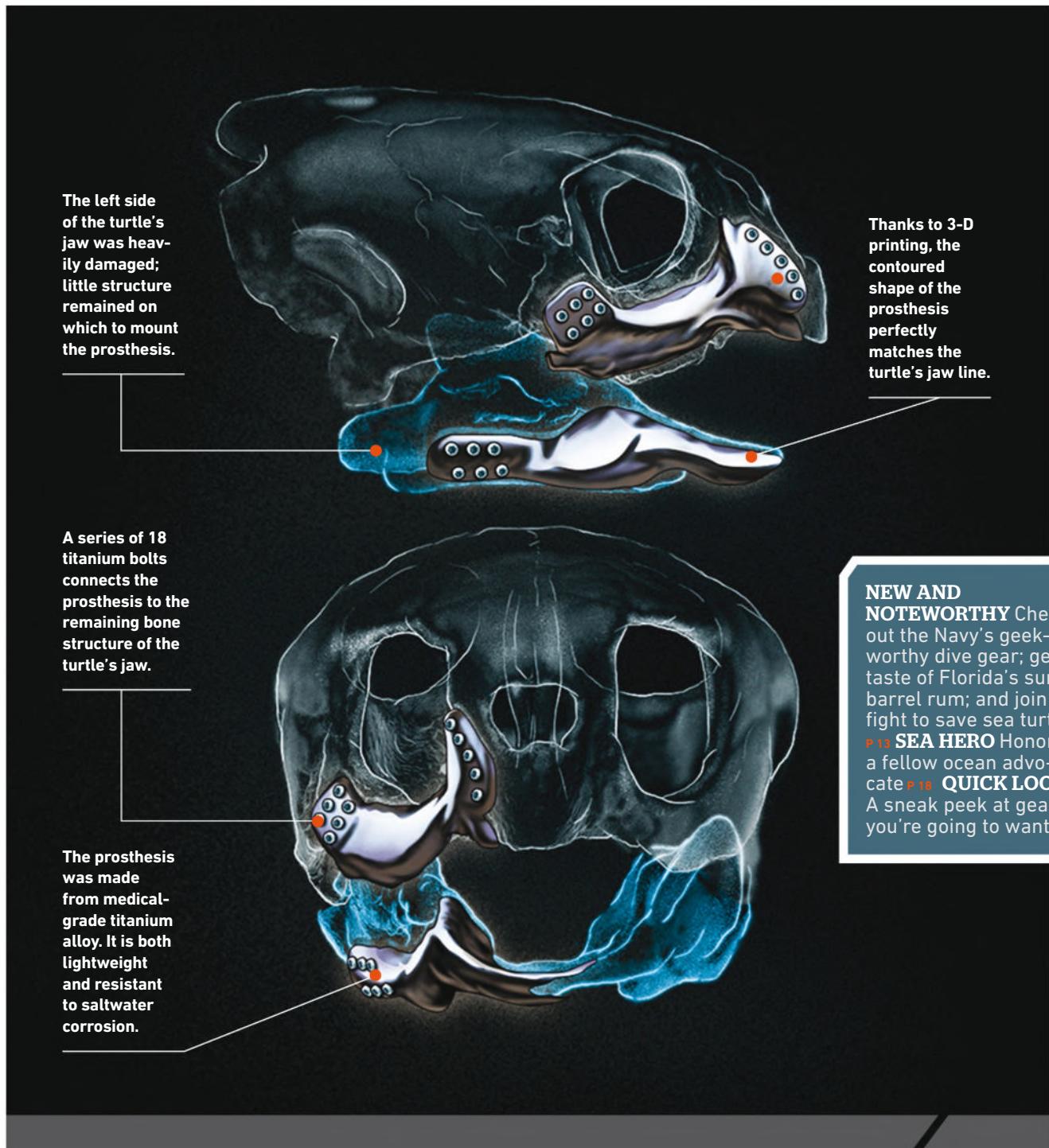
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# CURRENT'S

NOTES, NEWS AND STUFF YOU CAN USE



**NEW AND NOTEWORTHY** Check out the Navy's geek-worthy dive gear; get a taste of Florida's sunken-barrel rum; and join the fight to save sea turtles. **P 13 SEA HERO** Honoring a fellow ocean advocate **P 18 QUICK LOOKS** A sneak peek at gear you're going to want **P 19**

## METAL MOUTH

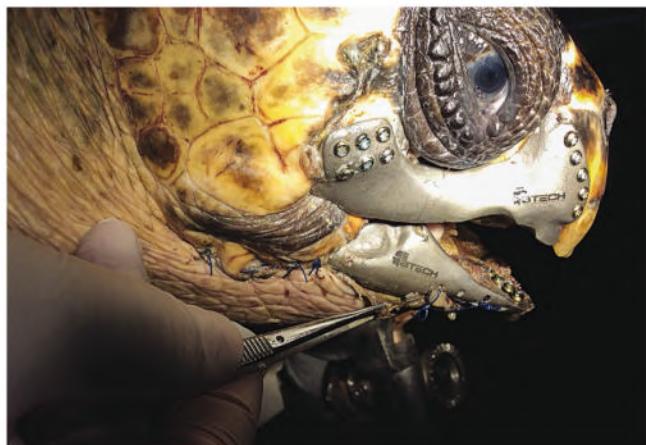
BY BERNARD WILCHUSKY

**H**ow do you make a prosthetic jaw strong enough to survive in the ocean but light enough to allow freedom of movement? You start with a 3-D printer. Shaping metal to such exacting specifications would, in other times, have been the work of a skilled artisan; recently, thanks to advances in 3-D printing technology, researchers were able to create a functional prosthesis for an injured turtle in only two months. There was just

one question: Who had the expertise to meld together industrial fabrication with veterinary science?

Enter BTech Innovations. This Turkish medical

jaw and skull; with that information, the BTech team created a bespoke virtual prosthesis that perfectly matched the contours of the wounded turtle's face.



biotechnology corporation specializes in crafting custom-designed prostheses and implants. It began by performing a series of detailed CT scans to map the structure of the turtle's

**To turn this loggerhead turtle into a cyborg of sorts, scientists used a 3-D printer to create a jaw that was lightweight yet durable.**

The turtle — named AKUT3 by its rescuers at Pamukkale University's Sea Turtle Research, Rescue and Rehabilitation Centre in Pamukkale, Turkey — was maimed last year by a boat propeller while swimming in the Mediterranean Sea. Jagged scars ran across its upper and lower jaws where the errant propeller had shorn away nearly half of its mouth. Without a prosthesis, AKUT3 would never eat on its own again.

After a two-and-a-half hour surgery, AKUT3 emerged from the operating room as the first of its species to benefit from 3-D printing techniques — but he's not the first turtle to sport a prosthesis.

That title goes to Allison, a loggerhead sea turtle living at the Sea Turtle Inc. rehabilitation center at South Padre Island, Texas. Allison lost three of her fins

to a shark attack in 2005. With only one functional limb, she could barely swim.

A solution wasn't discovered until Jeff George, the director of Sea Turtle Inc. reached out to a retired engineer. The engineer crafted a special dorsal-fin prosthesis that wrapped around Allison's shell and provided the stability necessary for the turtle to swim in something other than circles.

What surprised George most was not how the prosthesis helped Allison, but how Allison's prosthesis made her visitors feel.

"The thing that surprised me most is how quickly Allison is able to form a bond with people with prosthetic devices," George says. "There is a bond when people like veterans come to our center, people wounded by life, and they see how Allison has persevered."

*Salt Life*

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## THE DEVIL'S DUE

SPIRIT-SOAKED BARRELS, ARTIFICIAL REEFS AND AN UNDER-WATER HIDE-AND-SEEK GAME PRODUCE A NEW RUM-MAKING METHOD

BY MARY FRANCES EMMONS

What's better than celebrating the third anniversary of the sinking of southwest Florida's artificial reef *Mohawk* and at the same time honoring America's wounded warriors?

All that and a barrel of rum.

Sunken Barrel Mohawk Reserve Rum is a new release from Wicked Dolphin Rum that employs a unique method of recapturing "Poseidon's part" — or what bourbon makers call "the devil's cut," a term that describes trace spirits trapped in the wood of barrels used to age liquors.

Historically those trace spirits were lost in the

process, soaked into the barrels. That liquid could be useful in future production — adding complexities of flavor and color — but how to extract it?

Joe Weatherby of Artificial Reefs International — which has sunk reefs from Key West's *Vandenberg* to *Mohawk* and beyond — and some rum-making dive buddies hit on the idea of using the pressure-squeeze of the deep to force the wood to give up its treasure. Where can you find a safe place to hide a few dozen barrels down below? Turns out an artificial reef makes an ideal secret stash.

Wicked Dolphin, based in Cape Coral, Florida, filled five barrels with distilled water and sent them 90 feet down to the USS *Mohawk* Veterans Memorial Reef, then raised them 72 hours later. The recovered spirit-laced liquid was used to create 200 bottles of

Sunken Barrel Mohawk Reserve, the first rum of the deep to come to market.

The limited-edition spirit benefits Lee County's reefs program and Special Operations Bionic Warriors, which provides sports equipment, coaching and support to wounded or ill special ops veterans.

"We're proud to be able to create this special rum to honor the spirit of our servicemen, past and present," says Wicked Dolphin owner JoAnn Elardo. "The *Mohawk* Reef is a wonderful setting to bring this product to life."

Many other distilleries, dive groups and artificial-reef programs have already started producing rum via this method. On Dec. 5, Weatherby will sponsor a competition at First Legal Rum Distillery and Half Shell Raw Bar in Key West, Florida. To learn more about the event, go to [arireefs.com](http://arireefs.com).



COURTESY IMAGES, CLOCKWISE FROM BOTTOM: WICKED DOLPHIN (2); THE PEW CHARITABLE TRUSTS/JEFF BANUBE. OPPOSITE: COURTESY BTTECH INNOVATION

## PALAU TORCHES POACHERS' BOATS

BY SCUBA DIVING STAFF

They're mad as hell, and they're not going to take it anymore.

Lacking resources to enforce increased protection of its marine resources, another Pacific island nation is following in Indonesia's footsteps and torching the boats of foreign fishermen believed to be poaching in its waters.

Palau is the latest to seize and burn Vietnamese fishing boats, incarcerating their captains and repatriating the fishermen to Vietnam empty-handed. Authorities found more than 8 tons of sea cucumbers and reef fish aboard four



boats, which were towed to sea and set alight.

"We hope to send a very clear message to poachers who are raping our marine environment," Palau's president, Tommy E. Remengesau Jr., told *National Geographic*. "We will not tolerate any more unsustainable acts. Palau guarantees you will return with nothing."

In 2014, Palau, which created the world's first shark sanctuary in 2009, announced it would designate its 230,000 square miles of territorial waters as a marine protected area.



## READY ... SET ... FAIL!

AN ATTEMPT TO INSTALL AN ARTIFICIAL REEF OF EASTER ISLAND-STYLE SCULPTURES ENDS IN DISAPPOINTMENT

BY SARAH SEKULA

**A**rtist Dennis MacDonald intended to make a splash in the dive community and put Deerfield Beach, Florida, on the scuba map in a bigger way.

Instead, his giant sculptures, inspired by the famed heads of Easter Island, made waves of a different kind. MacDonald had spent four months crafting the 15 pieces out of concrete. On June 7, it took minutes for that dream to come to a sudden end when the barge carrying the Polynesian-style works overturned. The statues,

ranging from 6 to 22 feet tall, slid off and tumbled 70 feet below the surface. Only one remains intact; all others were destroyed. Local media quoted organizers who speculate that the barge might have been tipped by waves from a tug being used to position it. The barge's owners refute that, suggesting the barge was too top-heavy.

What was meant to be a one-of-a-kind sculpture garden and habitat for fish and coral is now a mishmash of concrete and rebar. The barge, 150 feet long by 45 feet wide, is completely upside down, with a lot of debris underneath. Despite the letdown, organizers say they vow to complete the \$500,000 project; MacDonald is already sketching new plans.

"The first 24 hours after the sinking was just numbness," MacDonald says. "But now it's excitement again, knowing we are going to complete this project."

Currently, due to the unstable barge



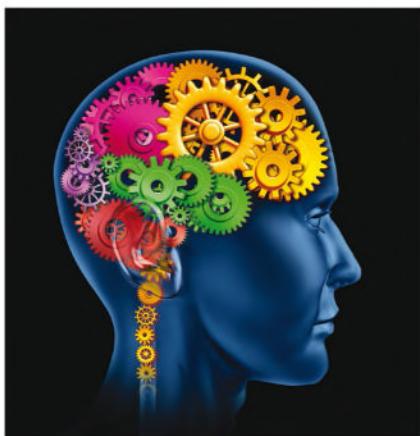
and plenty of jagged edges, it is not a safe dive site.

"I would caution any divers from penetrating the structure," says Howie Grapek, who has been diving for the past 30 years and photographed the underwater wreckage the day of the mishap. "It is definitely too early for fish to accumulate, so as of now, it is not really a good dive destination."

## HEAD CASE

RESEARCHERS INVESTIGATE MENTAL FITNESS AND ITS EFFECT ON DIVERS

BY KATIE POGGIO



**W**hile splashing into the thriving aquatic world, divers often have a lot on their minds: thrilling adventure, colorful species and short-lived bottom time, for example. One thing that is often overlooked is their mental health, which is what Diving Diseases Research Centre Healthcare in the United Kingdom is researching. Divers can contribute to this research study by filling out a short survey online.

DDRC Healthcare, a charity specializing in diving medicine, has been conducting the anonymous Health of Divers project since 2008. Since then, it has presented dive-centric research on illicit-drug use; attitudes toward and use of alcohol; cardiac health; and dental health. Marguerite St. Leger Dowse, who is running the study, explains that each

part of the project has led to the next, which ultimately inspired researchers to study the mental health of divers.

Dowse says the goals of the mental-health study are to examine the mental fitness of divers in more detail and find the prevalence of divers with depression. Currently, there are few resources of peer-reviewed literature regarding mental health and recreational diving.

"Divers grow into their illnesses, accept their health as a 'norm' and continue to dive, often without understanding the possible risks to either themselves or their diving companions," says Dowse.

When asked what mental-health issues are commonly overlooked by divers, Dowse says, "We hope that our data, because it is anonymous, will give us an indication regarding this fact."

The anonymous survey asks participants common questions such as age, gender, medications, weight and height (fair warning: It will test your ability to convert to the metric system), and smoking and alcohol-consumption habits.

Additionally, it inquires about panic and anxiety before or after a dive, along with how a diver's general anxiety levels have been within the past two weeks before taking the survey, on a "not at all," "several days," "more than half the days" and "every day" scale. Participants will be asked up to 50 questions, but the survey is estimated to take only five to six minutes overall.

Dowse suggests that divers should seek advice from a physician experienced in diving medicine if they are having any health issues or concerns that might affect their ability to dive safely.

To participate in this survey, go to [surveymonkey.com/r/LSKYVT7](http://surveymonkey.com/r/LSKYVT7).

## HIT THE GAS

NAVY DEVELOPS  
HELIUM-SAVING DEEP-DIVE SUIT

BY NADA HASSANEIN

**N**o one makes geek-worthy dive gear quite like the Navy — and it looks like it's at it again.

Scientists at the Naval Surface Warfare Center in Panama City, Florida, have developed a prototype for a new deep-dive life-support system intended to conserve helium (a valuable resource), accelerate the deployment of Navy divers and increase safety.

John Camperman, principal investigator at the Naval Surface Warfare Center, says this is a significant step in saving up to 80 percent of gas during military diving operations, compared with the present system.

The current technology is a Fly-Away Mixed Gas System (FMGS), which delivers a gas mixture to divers through an umbilical cord to a demand-regulated, open-circuit helmet. In this method, exhaled gas is released into the water, wasting a great amount of oxygen and helium.

The new rebreather system uses an umbilical-fed breathing loop that allows divers' exhaled carbon dioxide to be "recycled" by returning back through the helmet instead of into the water. Rapid 3-D printing techniques

OPPOSITE, FROM TOP: HOWIE GRAPEK (2); SHUTTERSTOCK



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were used to mold and cast the complex loop shapes that integrate the helmet and rebreather.

"The new system modifies the current helmet and rebreather. Prototype analysis and testing have shown that drastic reduction in helium consumption is possible," says Camperman.

"Testing of the new prototype system indicates that the full range of FMGS diving is supportable within Navy life-support requirements, and that several life-support characteristics are improved, including extended emergency come-home gas duration."

The new life-support system is a small step toward the Navy's Initial Response Diving initiative, the goal of which is to support faster recovery of objects in deep



waters. Examples of recovery efforts include aiding a disabled submarine, rescuing survivors of a capsized, or retrieving material after an accident before the ocean's currents sweep it away. The IRD goal is to allow divers to perform work that requires human intervention to depths of 600 feet within 36 hours of being deployed.

Conserving helium is not the only cost-effective aspect of this new technology. With the FMGS system, transportation, support-vessel size and consumables (helium and other necessary gases) contribute to sizable costs. If implemented, the new system will lower overall costs because less helium will reduce the overall deck-space requirements.

"[This technology] interfaces directly with the Navy-certified FMGS to save helium, without replacing the FMGS. Therefore it is a low-cost improvement for the Navy," says Camperman. "There are other systems that approach 100 percent [helium] reclaim, but using one of them would require replacing the FMGS, at much greater cost to the Navy."

Navy researchers are working on creating final prototypes to be ready for testing in December at the Navy's Ocean Simulation Facility, where divers will wear and test the rebreathers.

For more information on this, and other news from the Navy, go to [navy.mil/local/NSWC/](http://navy.mil/local/NSWC/).

## PULL IT TOGETHER

FIVE TIPS TO STREAMLINE GEAR  
BY TRAVIS MARSHALL

**S**taying streamlined underwater has many benefits, from reducing your risk of snagging hoses on delicate corals to improving air consumption by reducing drag as you swim. Follow these five tips to help stay sleek on your next dive.

### 1 CARRY ONLY WHAT YOU NEED

Loading down the D-rings with so much gear you look like a Christmas tree is a common mistake divers make. Instead of clipping on every gadget you own for every dive, be selective according to your dive plan. Shallow reef? Leave the stage bottle behind. Wreck penetration?

## HOW MANY WHALES CAN YOU SPOT?

HINT: IT'S NINE

What's so special about nine whales, you ask? It's a world record for the greatest number of humpback whales in one underwater image, and the record holder is photographer Darren Jew.

To add to the star power in this image, Guinness World Record free-diver Ai Futaki is photographed swimming alongside these magnificent and gentle giants.

This record-breaking moment was captured last year in Tonga, where humpback whales journey every year from July to October to mate and give birth.



Trade your fish ID cards for a reel and dive lights.

## 2 MINIMIZE AND SECURE HOSES

Never leave your hoses hanging, and cut out extra hoses when you can. For example, using a computer with a remote air sensor will eliminate the need for a high-pressure hose. Otherwise, make sure your octopus and gauges are clipped securely to your BC, with the hoses routed properly under your arms.

## 3 STOW THE SNORKEL

For many divers, a snorkel can be cumbersome underwater, and a snag hazzard. Sure, your open-water instructor said it was required equipment. But honestly, when is the last time you used it while scuba diving? Instead of clipping it on your mask, opt for a collapsible model that fits in your BC pocket.

## 4 DIAL IN YOUR WEIGHT

Wearing too much weight underwater forces you to overinflate your BC, which causes drag and burns more



air. Wear just enough weight that when you exhale completely at the surface, you sink to eye level. You'll have to work a little to descend at first, but once you're 5 to 10 feet down, you'll have near-perfect buoyancy, without adding any air to your BC.

## 5 GET THE RIGHT FIT

Comfortable, well-fitting gear is another key to staying streamlined, and the most important pieces to consider are your wetsuit and BC. The best way to get the right fit is to visit your local dive shop, where you can take your time to find the make, model and size that suit you perfectly. However, if you plan to use rental gear, show up at the dive center a little earlier than normal so you have time to try on a few sizes before heading to the boat.

## CURRENTS

# OCEAN ACTION



## SEA TURTLE CONSERVANCY

IN SEARCH OF A WORTHY CAUSE? HERE'S HOW YOU CAN HELP

**MISSION** Ensuring the survival of sea turtles in the Caribbean, Atlantic and Pacific through research, education, training, advocacy and protection of their natural habitats

**HQ** Gainesville, Florida **YEAR STARTED** 1959 **CONTACT** [stc@conserveturtles.org](mailto:stc@conserveturtles.org)

**PROJECT** The Sea Turtle Conservancy is the world's oldest conservation group of its kind; it works to protect these ancient reptiles through local initiatives and global expeditions in the areas of the world where turtles are most in need.

### 1 ADOPT A TURTLE

Not to worry, you won't need to find space in your house for this kind of adoption. But for \$30 or more, you can symbolically adopt a sea turtle for yourself or a friend to help ensure that turtle's survival. Once you've adopted your turtle, you'll receive a host of gifts, including a personalized adoption certificate, a guide to sea turtle conservation, a window cling and other turtle-related memorabilia.

### 2 GET TRASHY

The abundance of plastic garbage in the ocean is detrimental to all marine species, but this waste plagues turtles in particular. Reduce, reuse and recycle plastic materials topside — especially balloons, which sea turtles often eat by mistake — and encourage your community to do the same. Divers have the opportunity to take this a step further by removing trash and plastic waste found below the surface.

### 3 BE ADVENTUROUS

Need an excuse to travel? Reserve a spot on an Eco-Volunteer Adventure to Costa Rica! By participating in one of the Sea Turtle Conservancy's volunteer programs, you'll have the unique opportunity to locate, tag and record data on leatherback or green sea turtles during a session that lasts between one and three weeks. Prices for these all-inclusive trips range between \$1,439 and \$2,549 per person.



**People of action, devoted to protecting the planet's oceans and marine life through conservation, technology or by simply helping others. If you spot a Sea Hero, join *Scuba Diving*, Oris and the 2015 Sea Heroes program by nominating him or her at [scubadiving.com/seaheroes](http://scubadiving.com/seaheroes)**

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**SEA HEROES**

## LAURA JAMES

**OCCUPATION  
EXPLORER AND  
VIDEOGRAPHER**

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MIXED-  
GAS-DIVING  
INSTRUCTOR  
AND CERTIFIED  
REBREATHER  
DIVER**

**DIRECTOR  
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WHICH FOCUSES  
ON SEVEN SIMPLE  
SOLUTIONS TO  
REDUCE POL-  
LUTED RUNOFF**



**T**his two-time Emmy-winning filmmaker has devoted her life to the health of her beloved Puget Sound, and to teaching others to cherish our most precious resource: water.

### **WHAT'S THE MOST MEANINGFUL OF YOUR MANY PROJECTS, TO YOU?**

When we removed over 1,200 pounds of discarded marine batteries from the most popular dive site in Seattle. It was something I'd turned a blind eye to, just like everyone else; I'd basically taken those batteries for granted. When I go to that site now, it fills my heart with joy to know how the community came together, joined by divers from British Columbia and Oregon. A friend who owns a recycling facility gave us double the going rate on lead so we could afford more lift bags, and dive shops filled our tanks.

Seeing the sense of accomplishment and how engaged the whole community became gave me hope for the future.

### **WHAT'S THE BIGGEST CHALLENGE TO ADVOCACY FOR MARINE HEALTH?**

Learning to reach the "non-choir" and make the problem real to them. It's easy to speak to people who are nodding in agreement — it's more important to build a connection with a broader audience. One way to do that is to stop talking and listen to people who disagree or are on the fence, and enter a dialogue that allows both parties to find middle ground.

### **HOW CAN DIVERS HELP?**

The most powerful agent for change is an activated, involved public — the solution to the threats facing our oceans begins in our own backyards.

Each Sea Hero receives an Oris Aquis Date watch valued at \$1,595. At the end of the year, a panel of judges selects a Sea Hero of the Year, who receives a \$5,000 cash award from Oris to further his or her work. Go to [scubadiving.com/seaheroes](http://scubadiving.com/seaheroes) to nominate a Sea Hero today.

CURRENTS  
**QUICK LOOKS**

SCUBALAB'S QUICK  
GUIDE TO MUST-HAVE  
DIVE GEAR  
BY ROGER ROY

**1 SEALIFE SEA DRAGON 2500**

This 2,500-lumen photo/video/dive light is holy-cow bright, with a 120-degree beam. The control toggles through 100, 50 and 25 percent power, with emergency flash and SOS signals. Waterproof to 200 feet, with a 60-minute burn time, it comes with a tray, Flex-Connect grip, Li-ion battery, charger and case.

**SEALIFE-CAMERAS.COM; \$499**

**2 SEAC L70**

Seac's ultra-low-volume mask is so tiny it looks child-size. On your face, the semiframeless design brings the lenses in extremely close for a wide-angle view through the inverted-teardrop lenses, with internal volume so small you hardly need to consciously equalize.

**SEACUSA.COM; \$95**

**3 OCEANIC CYANEA**

A favorite when it was part of the Aeris gear line, the Cyanea has a comfortable ski-goggle elastic strap with a single adjustment at the back. The 1 1/4-inch-wide strap has nonslip strips to keep it in place, and a clever, built-in snorkel-holder loop. The double lenses are broad and deep for a big view, and the silicone skirt has a wide sealing area.

**OCEANICWORLDWIDE.COM; \$119.95**

**4 BODY GLOVE TRITON**

This new rear-zip 5 mm has radial shoulders and a V-cut neck that hugs without binding or restricting. The smooth-skin seals have zippered covers for easy on/off, and the thermally reflective lining keeps in warmth. Available in men's and women's sizes.

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# ENCOUNTERS

SEA WATCH

## SCHOOLING BARRACUDA

GROUND ZERO FOR A RELIABLE THRILL IS SIPADAN'S  
BARRACUDA POINT BY TRAVIS MARSHALL

DAVID DOUBILET/NATIONAL GEOGRAPHIC CREATIVE. OPPOSITE: ENRICO PATTI

One of the most recognizable fish that divers encounter throughout the world's oceans is the barracuda. Its pike-shaped body and gaping, toothy mouth give it away immediately. The fish can prove surprisingly docile despite its appearance, often hovering casually in the shade of a dive boat or alongside a coral head.

There are actually more than two dozen species of barracuda, and they range widely in size. The great barracuda — a common sight in the Caribbean — can grow to nearly 6 feet long. In the Indo-Pacific, the yellowtail barracuda tops out at only 2 feet.

Most commonly, divers spot barracuda swimming alone or in small groups of five or six, but some species can form vast schools, especially when they're still young, because schooling provides protection from larger predators. Few underwater encounters are more thrilling and sought after than swimming into a spiraling vortex of barracuda.

Barracuda schools can happen all over the world, especially in deepwater destinations like the seamounts of Mexico's Baja Peninsula or the mid-Atlantic Azores islands. But the reliable barracuda tornadoes that captivate underwater photographers usually happen among a specific species: the chevron barracuda (*Sphyraena genie* — also called blacktail barracuda), which ranges across the Indo-Pacific.

Chevron barracuda are easy to recognize, thanks to the pattern of V-shaped black bars that adorns the sides of their bodies. And while it's possible to see these fish form their

#### FAST FACTS: BARRACUDA



MAX LENGTH UP TO ABOUT 6 FEET

MAX WEIGHT UP TO 110 POUNDS

LIFE SPAN 10 TO 15 YEARS

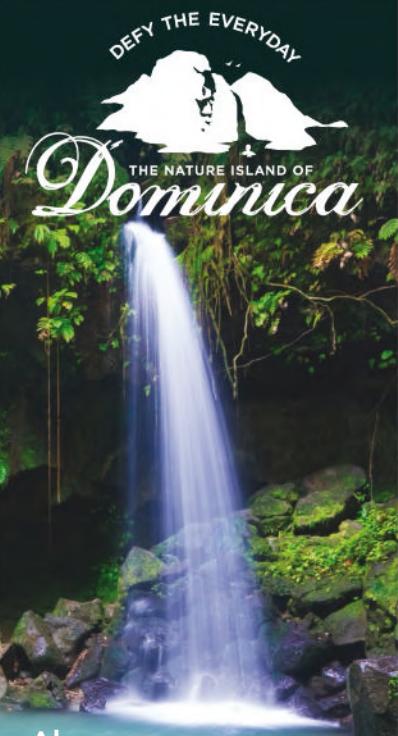
ENDANGERED STATUS BARRACUDA AREN'T IN DANGER BECAUSE MOST SPECIES HAVE NO COMMERCIAL VALUE.

FUN FACT BARRACUDA ARE ATTRACTED TO LIGHTED, SHINY, OR YELLOW OBJECTS OR FISH. THIS KNOWLEDGE ALLOWS SPORT FISHERMEN TO CATCH THEM EASILY WITH A YELLOW OR BRIGHT LURE.

massive schools in spots from Ras Mohammed National Park in Egypt's Red Sea to the seamounts of Papua New Guinea's Kimbe Bay, there's one place that is universally renowned for encounters with thousands-strong schools of barracuda: Sipadan Island off the Malaysian side of Borneo.

The Sipadan site called Barracuda Point starts along a sheer wall where gray reef sharks and bumphead parrotfish make regular appearances, eventually leading to an underwater plateau that is ground zero for huge shoals of barracuda in tornado-like formations. There are no guarantees in diving, but this site is frequently lauded for being a sure thing for divers seeking conglomerations of the barracuda kind.

**Chevron barracuda are easy to recognize, thanks to the pattern of V-shaped black bars on their sides.**



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SECRET SPOT

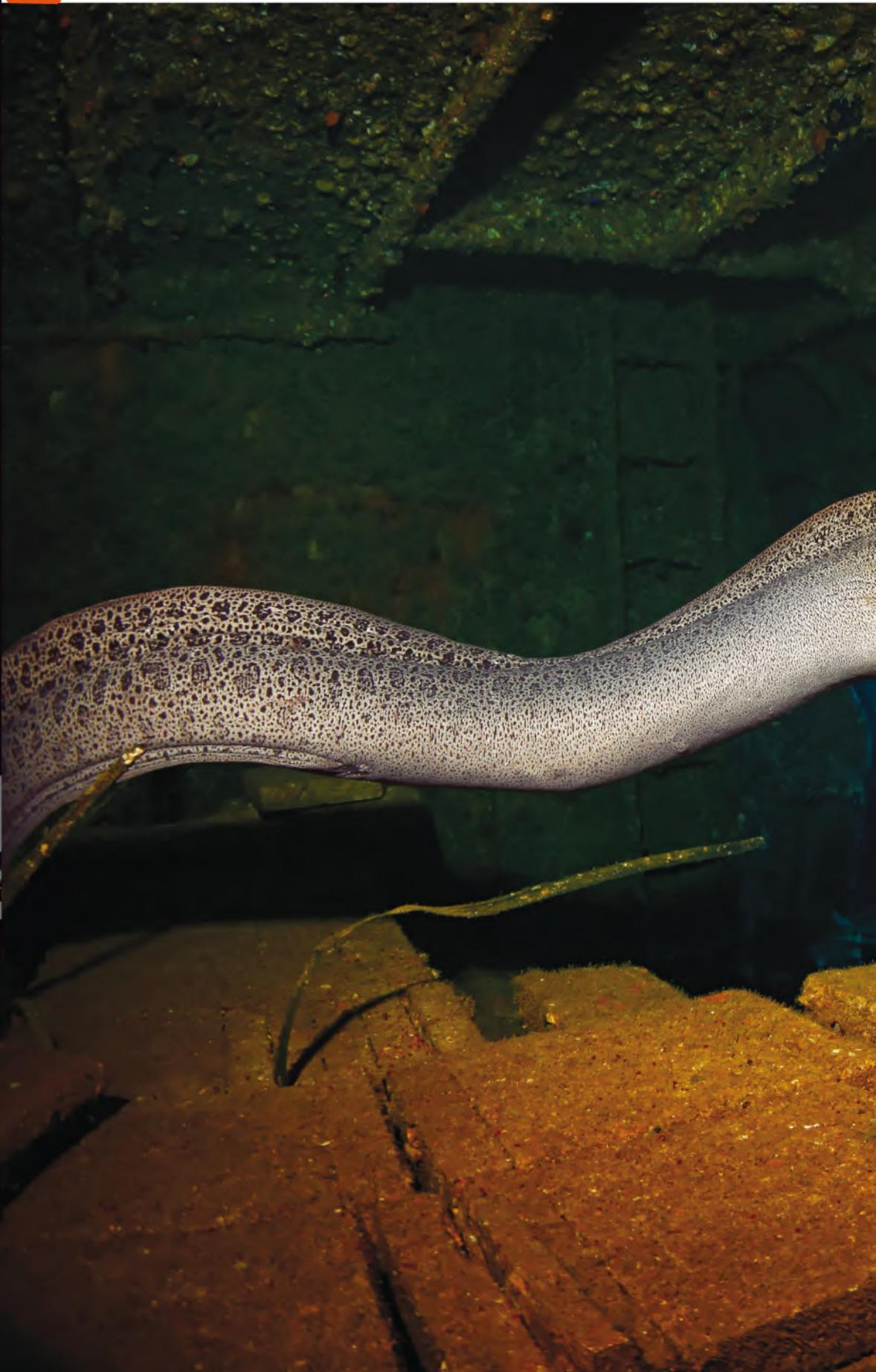


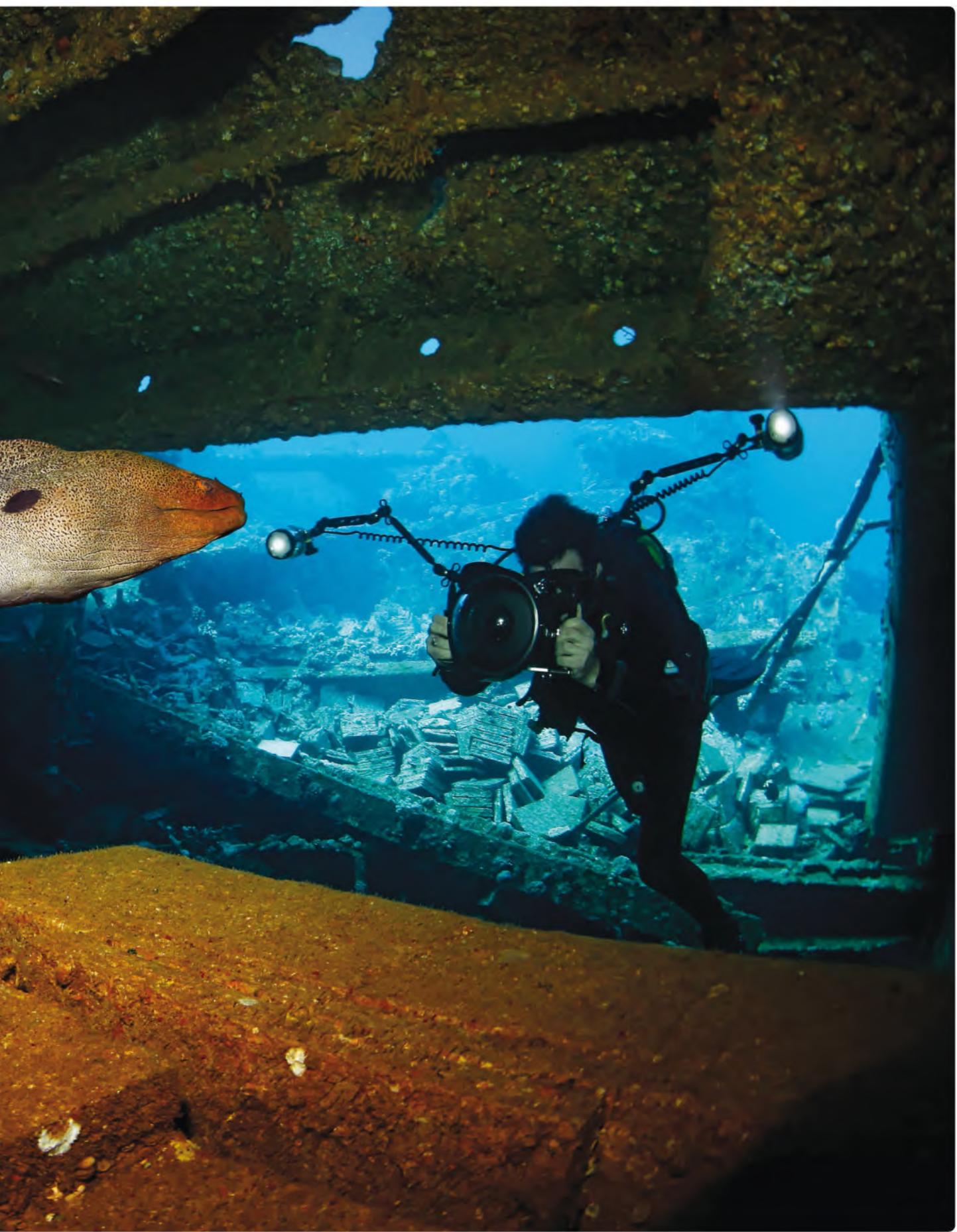
## SLITHERING SURPRISE

Sometimes encounters happen that couldn't have been planned better. One of these rare situations took place at the *Chrisoula K* wreck in the Red Sea. I was situated by a door frame, waiting for another photographer, when suddenly a giant moray eel swam through the small space between the door and me. I was shocked at first, but I recognized that this could be a fantastic photo opportunity. I quickly swam after the eel and caught it right above some Italian floor tiles that were the ship's main cargo when it sank in 1981. The encounter was so quick that I didn't have time to double-check my camera settings — luckily, they were just right.

TEXT AND PHOTO BY

TOBIAS FRIEDRICH





# CHAMELEON



MP206 CHAMELEON



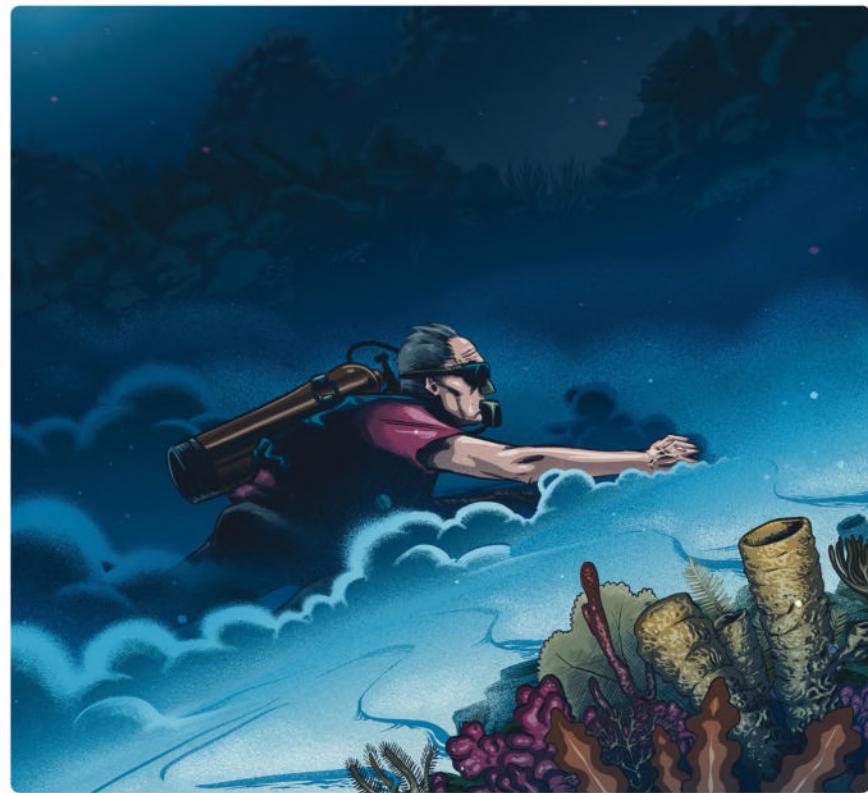
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WHAT IT'S LIKE

## TO BE CAUGHT IN A CURRENT

BY RON VAVRA

**A**mbergris Caye was a short hop on a 12-seater from mainland Belize. Looking out from its eastern shore, my wife and I could see Belize Barrier Reef, a white vapor-trail line dividing the aqua lagoon from the darker cobalt-blue sea beyond.

In the lagoon flanking the reef is an area designated Hol Chan Marine Reserve, named by the Mayans for a channel that cuts through the reef. Shallow and teeming with wildlife, the reserve seemed an undemanding start to our dive vacation.

Visibility in Hol Chan's aquariumlike habitat was excellent, so my dive-buddy wife was able to watch me from some distance as I wandered off toward the channel to take pictures.

When it was time to head back, she signaled me to join her. Swimming toward her, I became aware of the current for the first time.

I had been working against it all along but had been preoccupied taking pictures. The current was caused by an

outgoing tide that flowed toward the cut behind me.

I struggled to make progress. At 73, I'm in great shape, but I started to tire. I couldn't overcome the surge as my legs began to give out. Worse yet, I soon started being pulled backward, facing the grim prospect of being torn out of control through the channel and out to sea. I was using air at an alarming rate. I had to do something quick.

As my wife watched helplessly, I dropped to the bottom, desperately clawing at the sand and grabbing fistfuls of turtle grass to pull myself along. I made progress one foot at a time, setting a course parallel to the reef and out of the main tidal stream.

Finally, I got far enough from the channel that I managed to escape the brunt of the current. I gave my wife a thumbs-up to ascend, and we bobbed up 30 feet to the surface, where we got the attention of the divemaster. With strong, young legs, he helped me back to the boat, exhausted but safe.

**TALKING STORY:  
FROM TAILS  
TO TALES**  
STUDIES DEBUNK OUR  
TENDENCY TO EXAGGERATE  
BY SCUBA DIVING STAFF

You say that shark you saw was how long? Divers aren't immune to the fish story, defined as an "extravagant or incredible" tale, a saying derived from the human tendency to exaggerate just about everything. Earlier this year, the biological and medical sciences journal *PeerJ* studied maximum measured body length for some marine species; see how your best story stands up.

**22.96**

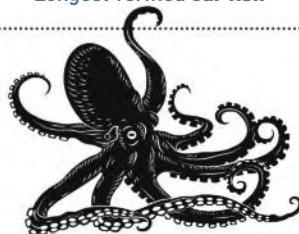
FEET

Maximum body length of **giant ocean manta** and **great white shark**

**26.25**

FEET

Longest verified **oar fish**



**32.15**

FEET

Longest **giant octopus**

**39.37**

FEET

Longest verified **giant squid**

**40.25**

FEET

**Basking shark length**

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**John Claytor sits on the boat he constructed for underwater logging.**

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POISONOUS SNAKES AND MAN-EATING  
CROCS – IT'S ALL IN A DAY'S WORK  
FOR DIVERS DOING THE ...**



# **WORLD'S DIRTIEST DIVE JOBS**

BY TRAVIS MARSHALL

For most divers, spending time underwater is all about having fun. But some see the underwater world in a totally different way: as a job – and a challenging one at that. From commercial divers to underwater investigators, we spoke to five brave men and women who earn their livings in treacherous environments, where their skill and experience keeps them safe when they work – underwater.



# WORLD'S DIRTIEST DIVE JOB: NUCLEAR REACTOR DIVER

**C**ommercial diving — working underwater, usually wearing a helmet with surface-supplied air rather than a scuba tank — encompasses a variety of diving jobs, but few raise eyebrows so much as those in and around nuclear reactors.

Before she went to commercial-diving school, Kyra Richter had been a scuba diver for 10 years, working as a dive instructor in Asia and the Caribbean, and as a technical cave diver in Mexico's cenotes. "Despite all this, I knew as a woman I'd have a hard time in the male-dominated environment of offshore commercial diving, even though my dream was to be a saturation diver," she says. "One of my instructors had photos of himself working in a nuclear plant, and it fascinated me from day one."

Today, Richter is a nuclear-dive-program supervisor for a plant in Michigan and has consulted on programs in the United Arab Emirates and South Korea. "Nuclear diving is a mix of inland and industrial diving, which means we work in rivers, lakes and oceans, and in man-made intake tunnels, condensers, pools, tanks and other structures inside the plant," Richter explains. "We work in open or closed systems, clean or dirty water, which is contaminated water that contains radioactive isotopes."

But for all the eyebrow-raising nuclear diving might cause, Richter says it's

one of the safest forms of commercial diving. "There is a lot less expense-cutting and a lot more support from the industry to appropriately staff a job," she says. However, that doesn't mean it's without risk.

"The worst-case scenarios are running out of air if the block of the hard hat freezes in cold water, or ending up in the wrong place on one of our many penetration dives," she says. Overexposing a diver to radiation is highly unlikely. "That's

**“THE WORST-CASE SCENARIOS ARE RUNNING OUT OF AIR IF THE BLOCK OF THE HARD HAT FREEZES, OR ENDING UP IN THE WRONG PLACE ON ONE OF OUR MANY PENETRATION DIVES.”**

why we clean all areas prior to work, do surveys of the work area, and the divers carry probes so that they can survey each area themselves before they walk into them," she explains. "We're also remotely monitored by radiation-protection technicians who can get instant readings on the doses we're receiving."

BOB STEFKO

A color photograph of Kyra Richter, a woman with dark hair tied back, wearing a full-body black and red nuclear diving suit. She is standing on a concrete pier, holding a scuba diving regulator in her hands. The background shows the ocean and a clear sky. The image is framed by a vertical black bar on the left and a vertical white bar on the right.

Kyra Richter in her nuclear diving suit near the Michigan plant where she works.

WORLD'S  
DIRTIEST DIVE JOB:  
UNDERWATER  
**CRIMINAL  
INVESTIGATOR**





**Officer Michael Berry at Virginia's Appomattox River, a favorite training site.**

**W**hen bad guys want to cover up a crime, they often try to hide the evidence underwater. "Every bridge is a potential dump site, where a murderer can toss a weapon with a flick of the wrist and think it's gone forever," says Michael Berry, founder and president of Underwater Criminal Investigators. "It's my job to not only find these items, but also recover them in a way that preserves any fingerprints, DNA or other evidence that might be left behind."

When Berry started working as a police diver, there was no standardized training. "Everybody was studying rescue diving, but the reality is, the majority of what we do is recovery," he says. He went on to develop the first Underwater Criminal Investigator course for PADI; today, UCI is a leader in police search-and-recovery training.

Over the nearly 30 years he has worked as an underwater investigator, Berry

**“EVERY BRIDGE IS A POTENTIAL DUMP SITE, WHERE A MURDERER CAN TOSS A WEAPON WITH A FLICK OF THE WRIST AND THINK IT'S GONE FOREVER.”**

has found himself diving in every type of environment imaginable, and has encountered his share of aggressive wildlife along the way.

The worst problem he encountered came from bacteria. "I was diving in a rock quarry that had turned to mud over the years, looking for stolen merchandise, and I came across a bag filled with the rotting corpses of puppies and kittens," he says. "I ended up catching meningitis and was out of commission for months — it almost killed me."

MIKE MORGAN



**Florida's Suwannee River is fertile ground for John Clayton.**

**F**or technical-diving instructor John Clayton, the swamps and riverbeds of Florida and Georgia are a treasure trove of lost old-growth lumber.

His story starts in the late 19th century, when a logging boom was in full swing, harvesting old-growth trees and transporting them by barge along U.S. waterways.

Claytor says experts estimate around 10 percent of those logs were lost when barges carrying them sank. The low oxygen content at the bottom of these rivers and lakes preserved the wood, and the scarcity of the logs makes them valuable.

"I started diving around here in 1965, when I was in junior high, hunting for old

## DIRTIEST DIVE JOB: **DEADHEAD LOGGER DIVER**

bottles and Native American artifacts. Everywhere I dived, I'd see these logs all over the bottom, so I started keeping track," Clayton says. "Years later, I had to screw my head on right and start making a living. I had a lot of MacGyver blood in me, so I went back to those old notes and started teaching myself how to pull those logs out and process them into lumber."

Today, Clayton and his son bring the trees up, dry them out, cut them into lumber, and then use them to create custom projects like furniture and flooring.

But the work, called deadhead logging, is one of the most dangerous types of logging. Underwater crews have been featured on the History channel show *Ax Men*. "I try to block out the negative when I'm down there," says Clayton. "I've dealt with every hazard you can think of, from poisonous-snake bites, alligators and 250-pound snapping turtles to getting caught in fishing lines and nets."

However, he says the biggest risk is the logs themselves. "Four years ago, I had a log come loose from a grapple in the current, and it pinned me to the bottom," he says. "No one was coming to get me — I don't have any dumb friends — but luckily, I managed to dig myself out. Now I have vertebrae in my neck fused with a metal strap and 14 screws."

**“I HAD A LOG COME LOOSE IN THE CURRENT AND IT PINNED ME TO THE BOTTOM. NO ONE WAS COMING TO GET ME, BUT LUCKILY, I MANAGED TO DIG MYSELF OUT.”**

WORLD'S  
DIRTIEST DIVE JOB:

SAFETY/

# CROC WRANGLER

**S**outh African divemaster Richard Bolter has a truly unpredictable and dangerous diving job in a rare niche of his own creation. "More people have gone to the moon than do what I do," he says. That's because he's a fixer and safety diver who specializes in arranging and leading diving expeditions for underwater photographers who wish to go face to face with deadly, man-eating Nile crocodiles in Botswana's famed Okavango Delta.

"I first got the idea while I was visiting the area with some friends on a bush holiday," Bolter says. "During the summer months, the water gets crystal clear, and when I went under the water for the first time, I realized the crocs didn't react the same as they do on the surface." This led Bolter to establish certain

rules of engagement that keep him and the divers that accompany him safe.

The most important rule: Never spend any time on the water's surface, which sparks the crocs' attention. "It's military-style diving getting in and out of the water," he says. Bolter also carefully vets any divers who want to hire him, and limits his

**“WHEN I WENT UNDER THE WATER FOR THE FIRST TIME, I REALIZED THE CROCS DIDN'T REACT THE SAME AS THEY DO ON THE SURFACE.”**

services to professional documentary-film crews. "This environment is just not safe for tourist divers," he says. "A company started bringing groups of tourists once, and soon a diver lost an arm to one of the crocs."

Bolter says the key to successful encounters is cruising the canals, looking for crocodiles sunning themselves on the banks. "Usually they slip into the water when we pass by," he says. "Then we jump in upstream and ride the current to where I predict they'll settle on the bottom." Underwater, the crocs are often placid, or at least have little interest in the divers. "They have very poor eyesight underwater, so they don't really notice us, even up close," he says. "But if you touch them anywhere near the side of the face, they attack."

**“More people have gone to the moon than do what I do,” says Richard Bolter.**



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OF ADVENTURE

The Ocean Corporation is a diver-training facility in Houston. Its campus has a dive-tank training complex, two decompression chambers, a diving bell, and "nondestructive testing" inspection equipment. Ocean Corporation offers two training certification paths that lead to a number of commercial-diving career possibilities.

### Ultimate Diver Training

This program prepares divers to perform inspections, repairs and support services for a variety of projects or facilities including nuclear power plants, bridges, municipal wastewater facilities, dams, ship harbors, ports, water towers, resorts and cruise lines, and aquariums.

### Nondestructive Testing Training

NDT inspectors use sophisticated technology and equipment to identify and diagnose flaws in steel and concrete without disrupting the integrity of a structure. Certified NDT technicians perform inspections all over the world, in nuclear power plants and oil refineries as well as on airplanes, oil rigs and more.

To learn more, visit [oceancorp.com](http://oceancorp.com).



**"Saturation diving is the endgame" of commercial diving, says Brian Lacey.**



ROBERT SEAL

## WORLD'S DIRTIEST DIVE JOB: OFFSHORE SATURATION DIVER

In the world of commercial divers, saturation diving is the endgame," says Brian Lacey, a commercial and saturation diver based in Houston who freelances for oil and gas companies in the Gulf of Mexico, and overseas in countries such as Russia, India and Indonesia. "It's the job everyone wants, and the only reason any of us do it is the money — it's like being in jail for a month at a time."

That's because saturation divers do their work while living inside a diving bell or compression chamber. As anyone with a scuba certification knows, a diver's body absorbs nitrogen under pressure. Recreational divers minimize this with time limits and slow ascent rates to avoid the bends, but saturation divers go under pressure and stay there until their bodies become saturated with nitrogen and can't absorb any more. Saturated divers can dive indefinitely at great depths, as long as they stay under pressure. When the job is done, they're slowly decompressed inside the chamber.

"A standard run is 30 days down, with a two-man team taking turns, working five hours at a time in the water," Lacey explains. "The deepest

job I ever did was 900 feet, and it took seven days to decompress afterward, but the average is about 300 feet, with 3½ days of deco."

Although it's boring, the saturation part of the job isn't particularly dangerous. Lacey says the greatest risks arise when he's actually on a dive, where his job is assembling or taking apart oil and gas equipment, such as oil rigs and pipelines. "Working with underwater cutting torches is probably the most dangerous thing we do," he says. "As you cut, the torch puts off hydrogen gas, and if you happen to be under a ledge, the gas can pool, and a spark from your torch can cause a major explosion — I had a small explosion once that rocked my head so hard it knocked the defog soap from my mask plate into my eyes."

**“THE DEEPEST JOB I EVER DID WAS 900 FEET, AND IT TOOK SEVEN DAYS TO DECOMPRESS AFTERWARD, BUT THE AVERAGE IS ABOUT 300 FEET, WITH 3 1/2 DAYS OF DECO.”**



# OLWOL.GIN



**Tim Muscat negotiates his rebreather through the green waters and scalloped walls of Olwolgin Cave.**



# ODYSSEY

TEXT AND PHOTOS BY LIZ ROGERS

WHAT DIVE IS WORTH  
CAMPING OUT IN THE  
NULLARBOR DESERT,  
500 MILES FROM THE  
NEAREST TOWN?

AN EXPLORATION OF  
THE DOWNSTREAM POR-  
TION OF AUSTRALIA'S  
IMMENSE OLWOLGIN  
CAVE SYSTEM —  
LARGER, LONGER AND  
MORE COMPLEX THAN  
THE UPSTREAM SIDE



**he adventure starts, as all Nullarbor trips do, with packing. Spare batteries — camera, strobes, primary light, backup lights, video lights, headlight for camping. Food — cooked and frozen pasta and stews, roasted nuts; don't forget the washing-up bucket. Tanks and tents, underwater lights, drinking-water drums, a camping stove, hundreds of feet of guideline. There are no opportunities to buy on arrival when you're on a road trip to the middle of nowhere. We will be completely self-sufficient for the duration of our stay, camping by the cave entrance, generating our own power and filling our own tanks. From my home in Melbourne, Australia, it's more than 1,400 miles to Olwolgin Cave.**

### **NULLARBOR BOUND**

Most stories of diving the Nullarbor caves talk about the route. First, major multilane highways. Then, after Adelaide, gentle rolling hills and billboards. As the farmed greenery fades away nearly 1,000 miles later, options disappear. From here, it's a single-lane highway snaking along the southern coastline of our continent.

We pass suicidal kangaroos and thundering road trains, and stop for the night in a tiny country town. Two days later we are on the Nullarbor proper, where the Southern Ocean crashes against high limestone cliffs.

The Nullarbor Plain was named from the Latin "null" and "arbor," meaning "no trees." It makes flat and featureless into a feature. The limestone cliffs swerve inland from the sea, and we drive down onto the lower plains. From

the highway turnoff, it's a slower and bumpier journey along a dirt track.

The entrance to Olwolgin Cave is just under a mile from our campsite. After initial trips walking tanks between camp and cave in backpacks, some bright spark pointed out that the sandy walking track had become quite flat. The next trip out saw an explosion of wheelbarrows. The key to correct wheelbarrowing of dive gear is to move most of the weight over the front wheel, reducing stress on the arms. Of course, if you move all of the gear to the front, the wheelbarrow is almost impossible to steer and will tip over uncontrollably. Like many things in life, it's a balance.

**Divers stop along a dirt track to check their load (below). Squeezing through a tight downstream section of Olwolgin requires removing one sidemount tank.**



### **A FUZZY FRONTIER**

Because we are down below the cliff line and close to the water table, the entrance to Olwolgin is a small depression rather than a massive doline. A rocky overhang shields two pools of water from the midday sun. Both were first dived in early 2002; the more promising-looking pool was declared a no-go — too small, with no way on. The smaller, harder-to-climb-into pool did the opposite — it opened up to a maze of shallow tunnels. Over the course of a few years and a lot of trips, the known extent of the tunnels was festooned with orange guideline, and the map rapidly expanded.

Unlike the clear-blue water and huge tunnels of the deep caves above the cliff line, Olwolgin features dark-green



water. In some underwater caves elsewhere on the planet, divers can see a halocline — a clearly visible layer where heavier salt water and the overlying fresh water mix. In Olwolgin, this layer is dispersed through the tunnel, with the different salinity concentrations blending smoothly into each other. When we unavoidably swim through the mix, the disturbance creates a blurry layer of water that bends and traps light. I watch my buddy, Tim Muscat, swim past, seeing the wake of

his gentle fin kicks in whirling fuzzy water behind him.

The mixing layers have created fantastic shapes, eroding the limestone at every level. But it makes photographs difficult — I cannot take a picture through water that someone has swum through. Instead, I find myself swimming hard up against one wall before turning into the middle of the tunnel and doubling back toward my following buddy. As long as both Tim and I keep moving forward into

undisturbed water, the photos are clear and sharp. If I stop, the fuzzy mixing layer envelops the front of my camera housing. There are a few midwater collisions as we try to get the timing right. Tim is remarkably patient with my camera obsession. Distracting, unseen tunnels beckon left and right at every intersection of the guideline.

Tree roots from the surface have found their way down to the cave below, spreading out on subterranean

*(continued on page 42)*

**AS LONG AS BOTH TIM AND I KEEP MOVING FORWARD INTO UNDISTURBED WATER, THE PHOTOS ARE CLEAR AND SHARP. IF I STOP, THE FUZZY MIXING LAYER CATCHES UP WITH ME .**



#### **WHAT IT TAKES**

Olwolgin is classified as an advanced dive site. Bookings of qualified divers are managed through the Western Australia Department of Lands. By limiting the number of divers, each diver has a better experience underwater, and the impact on the cave is reduced.

To become qualified for cave diving in Australia requires three courses after your Advanced Open Water cert: Deep Cavern, Cave and Advanced Cave. Each has experience requirements and prerequisites. Divers with other cave qualifications can complete crossover courses with the CDA; international visitors can obtain a visitors permit and temporary membership of the CDA with a local sponsor.







## 5 TIPS FOR SHOOTING OLWOLGIN

Olwolgin is a challenging place to take photos, with green, blurry water and things like navigation to concentrate on. Photographing here takes special techniques to capture the cave.

### 1 Add more light

Although the water is dark, the cave walls are white. By putting extra strobes on your buddy, you can extend the light beyond the camera and bring depth to the photos.

### 2 Keep swimming

The mixing halocline layer will make every photo look out of focus. Keep moving forward into undisturbed water to get a clear shot.

**3 Pre-focus** Modern cameras are great at low-light focusing, but they still struggle in darker caves. Your buddy might not appreciate a primary light in her face for focusing each shot. Pre-focus the camera at the right distance, and snap happily.

**4 Go wide** Tunnels here can be large, but there are beautiful sights in the smaller areas too. The little tunnels don't provide an opportunity to back up to capture it all, so a very wide-angle lens is key.

**5 Be gentle** Olwolgin has some beautiful and very delicate features such as tree roots and scalloped rocks. Before you get close to them to photograph, work out how to carefully approach each one, and think through how you're going to swim away afterward without causing damage.

**Paul Hosie (left), the original Olwolgin explorer, and Richard Harris hover, lighting up rock formations in the upstream side of Olwolgin Cave.**

(continued from page 39)

surfaces until they drop into the depths under their own weight. The saltier layers farther down kill the roots, and the tree starts anew, growing another net of roots on the surface. The ghostly remains underneath form a fragile, tangled web hanging in the water. Signage reminds divers to swim along set pathways, ensuring that neither water movement nor a careless exhalation destroys these eerie creations. I try to get close enough for photos while staying far enough away to protect the roots from my presence.

#### A TALE OF TWO POOLS

The rest of the team is not here for photographs. After several years of exploration and new tunnel discoveries via the first entrance pool, the



## THE SCALLOPING IN THIS NEWLY REVEALED SIDE IS STUNNING, AND BIGGER TUNNELS GIVE MORE ROOM TO AVOID FUZZY WATERS.

cave seemed to have given up most of its secrets. Then, on a trip in late 2010, original explorer Paul Hosie decided to have one more look into that promising pool on the other side of the depression. With years of familiarity with the cave and its small crevices, he pushed down a twisty underwater chimney and through nearly 200 feet of a very small flattener. With an epic effort behind him — and a long, zero-viz exit — he was rewarded with a massive tunnel ahead. Suddenly, the push for newly discovered cave tunnels was on again, and the “downstream” Olwolgin rapidly showed itself to be larger, longer and more complex than the originally

discovered “upstream” side.

While the others eagerly push into unknown territory and find interconnecting side passages, I rejoice in being able to maneuver my large camera housing through the very small entrance. The rock scalloping in this newly revealed side of the system is stunning, and bigger tunnels give more room to swim around the fuzzy waters. Tim and I have limited time, and we select the most photogenic areas to visit, capturing images of places seen only by two or three divers so far.

Over the past five years, downstream Olwolgin has been the gift that keeps on giving. The

The author clambers out of the small, muddy entrance pool (above). A diver weaves his way under delicate root formations in a section known as the Hanging Gardens of Babylon.

exploration frontier is now more than a mile from the entrance, with more than 5 miles of mapped passages. There are huge rooms that make you wonder what’s holding up the roof, and tiny restrictions to convince you that you’ve reached the end of the cave — until squeezing through reveals large, continuing passages. In places, the roof has one set of bubbles down the middle, evidence that the exploration divers swam straight through to new territory, and no one has looked closely at either wall yet.

It’s a stunning cave, and it’s a privilege to be the first to dive these unseen places.

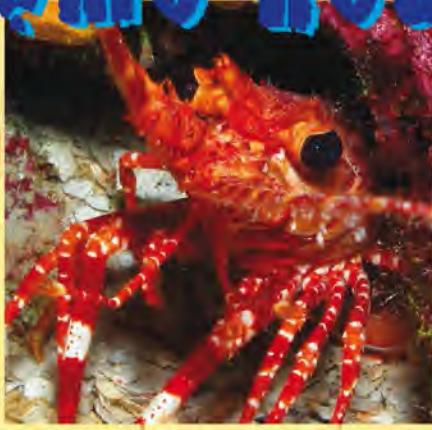
**NEED TO KNOW** Olwolgin is a long way from anywhere, and there are no commercial operators running cave-diving trips to the region. **PLANNING** A trip to the Australian desert carries its own risks completely separate from the cave-diving experience. A car breakdown without appropriate **EQUIPMENT** can leave you stranded and in serious trouble. Things like additional spare tires, a satellite phone and an extensive first-aid kit should all come into consideration. From a diving perspective, there are no spares on site. The most innocuous failure (like a drysuit seal or a smashed prescription mask) can leave a diver sitting at camp while the rest of the team enjoys themselves underwater. Think through your kit and consider things you don’t have a second option for

because they rarely break. Both the car trip across the country and the wheelbarrow trip into the cave can lead to unexpected gear breakage before you even hit the water. **COSTS** for diving here are not huge; the **ACCOMMODATIONS** come at the cost of a BYO tent. Fuel for the vehicle, a hotel room for a night along the way, and beer for your stay-at-home dive buddies so you can borrow their dive gear for extra spares are the largest expense items. **TEMPERATURES** can climb to more than 100 degrees during the day and drop below freezing at night at any time of year. So, although spring and fall tend to be milder, a warm sleeping bag and a big hat are essential. Once in the cave, the water stays a constant 61 degrees year-round.



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WORLD CLASS DIVING SO CLOSE TO HOME

© Stuart Cove's Dive Bahamas, Nassau, Bahamas. Images courtesy Stephen Frink/Waterhouse.



## PART 2: REGS OVER \$500

## FRESH AIR

ScubaLab tested eight new regs – all priced at more than \$500 – on the ANSTI breathing simulator and in the water; find out how they stacked up

BY ROGER ROY PHOTOGRAPHY BY ZACH STOVALL

## WHAT YOU GET FOR THE PRICE

The regs we tested in this price range showed slightly higher performance overall on the breathing simulator than their thriftier brethren (principally at greater depths and extreme breathing rates). But testers found that some features on these regs added comfort and convenience. Breathing



adjustments allowed fine-tuning airflow with changes in depth or breathing demands. Exotic materials helped keep components light for comfort without sacrificing performance or durability. And first-stage features like rotating barrels or extra ports provided more hose-routing options.

## REGS, PART 2

With so many new regs in this year's ScubaLab test we split them up, reporting our results for regs priced at \$500 and under in our July issue. This month we evaluate the performance of regs at the higher end of the price range, with results from test divers and the ANSTI breathing simulator.

“  
One of the smoothest air deliveries I've used.”

—TESTER

SCUBALAB  
TESTERS  
CHOICE  
2 0 1 5

SCUBAPRO  
MK25 EVO/G260

PRICE \$689 CONTACT [scubapro.com](http://scubapro.com)

With its rugged, matte-black-and-metal second stage and performance cred, this reg gives off a "just-for-techie" vibe. It backed that up in our ANSTI testing, chalking up excellent ratings at all depths and breathing rates, recording the lowest work-of-breathing scores at recreational depth, and delivering air within our test parameters, even at a tortuous 75-liter-per-minute breathing rate down to 240 feet — the deepest of any reg in our test. But test divers found nothing muscle-bound about its in-water performance, where it earned comments including "super smooth" and "like butter!" Divers liked the reg's effective Venturi and breathing-adjustment controls, and its just-right purge, but what they loved was that smooth, effortless breathing. It tied the high ergonomic scores in every category except head-down position, where divers rated it just good for ease of breathing and dry air. It also made its way onto more divers' top-three-favorites lists than any other reg in the test. The MK25 EVO/G260 is our Testers Choice.

## BREATHING SIMULATOR RESULTS



**HOW WE SCORE** ANSTI breathing simulator results shown here are based on a score of 1 to 5, where 5 represents excellent performance with work-of-breathing measures of 1 joule per liter or less at carefully regulated depths and breathing rates and volumes. See How We Test on the next page for more details.

## HOW WE TEST

ScubaLab put these regs through two tests — the first is conducted on a breathing simulator, and the second by our team of test divers.

### OBJECTIVE TESTING

We conducted tests on an ANSTI wet breathing simulator at Dive Lab, a commercial test facility in Panama City Beach, Florida. The simulator measures the effort (work of breathing) required to move air through a regulator as it is subjected, underwater, to a precise series of depths and breathing rates.

The simulator pressurizes the test chamber to simulate



depths of 132 feet of seawater, 165 fsw and 198 fsw. Each "breath" by the machine moves 2.5 liters of air through the regulator, at breathing rates of 15, 25 and 30 breaths a minute. These precisely measured volumes of air — 2.5 liters multiplied by the breathing rate — are called Respiratory Minute Volumes (RMV).

**37.5 RMV @ 132 fsw:** This represents the maximum recreational depth at a somewhat aggressive breathing rate.

**75 RMV @ 132 fsw:** This simulates the potential demand at maximum recreational depth for a diver at an extremely heavy work rate, or loosely simulates two divers buddy breathing at a somewhat aggressive rate.

### 62.5 RMV @ 165 fsw:

This represents the European conformance standard EN250, and is also the depth and breathing rate commonly used by manufacturers when determining a regulator's performance.

**62.5 RMV @ 198 fsw:** This is the U.S. Navy's Class A test depth and breathing rate (although the Navy uses a higher HP supply pressure than we do).

The simulator

monitors how much effort is required to breathe, measuring the work of breathing in joules per liter (j/l). In our ratings, a score of 1 = 3 j/l or greater; 2 = 2.26-3.0 j/l; 3 = 1.51-2.25 j/l; 4 = 1.1-1.50 j/l; and 5 = 1 j/l or less.

We don't test on the simulator for a pass/fail grade, but to objectively gauge performance in carefully controlled conditions. You can see how each reg performed on the breathing simulator in the charts that accompany the reviews.

### ERGONOMIC TESTING

We conducted these tests at Alexander Springs in Florida, with a team of divers who recorded their scores during their dives using underwater slates and waterproof

test sheets. Divers evaluated each regulator in 13 specific performance areas, assigning scores from 5 (excellent) to 1 (poor), and recording their observations and comments about factors that determine the comfort and performance of the regs while they were actually being used.

### ERGO TEST CATEGORIES

**1** Ease of breathing in swimming position

**2** Ease of breathing in head-up position

**3** Ease of breathing in head-down position

**4** Wetness in normal swimming position

**5** Wetness in head-down and odd positions

**6** Bubble interference in normal swimming position

**7** Bubble interference in vertical/stationary position

**8** Ease of clearing regulator using the blowing method

**9** Ease of clearing regulator using the purge button

**10** Purge button stiffness and comfort

**11** Comfort of mouthpiece

**12** Venturi-lever adjustment function and effectiveness

**13** Breathing-adjustment-knob function and effectiveness

### DIVE DEEPER

To see complete test scores, go to [scubadiving.com/regs-over-500](http://scubadiving.com/regs-over-500).

“Very good breathing adjustment — effective and pinpoint.”

— TESTER



## CRESSI

### T10-SC MASTER BALANCED

PRICE \$679.95 CONTACT [cressusa.com](http://cressusa.com)

The SC designation on this model of the new T10 stands for "sealed chamber," signifying the environmentally sealed diaphragm first stage that's rated for cold water. The T10's second stage has a wide, elliptical diaphragm with a titanium trim piece around the purge and a large, knurled, metallic breathing-adjustment knob. All that metalwork gives it a somewhat beefy look, but test divers found that the second stage is actually quite lightweight and easy on the jaw. Test divers rated it very good for ease of breathing in swimming position, dry-air delivery in any position, ease of clearing, and effectiveness of the breathing adjustment, which divers found easy to dial in thanks to that oversize, grippy knob. Some divers found the wide, narrow purge cover somewhat stiff and thought it required a little getting used to, but they also noted it didn't free-flow even in strong current. In ANSTI testing, the T10 proved one of the top performers in our test, racking up excellent scores for ease of breathing at all depths and breathing rates.

### BREATHING SIMULATOR RESULTS



KATY DANCA GALLI, OPPOSITE; BOTTOM: JON WHITTLE



“  
It almost  
anticipates  
your next  
breath.”

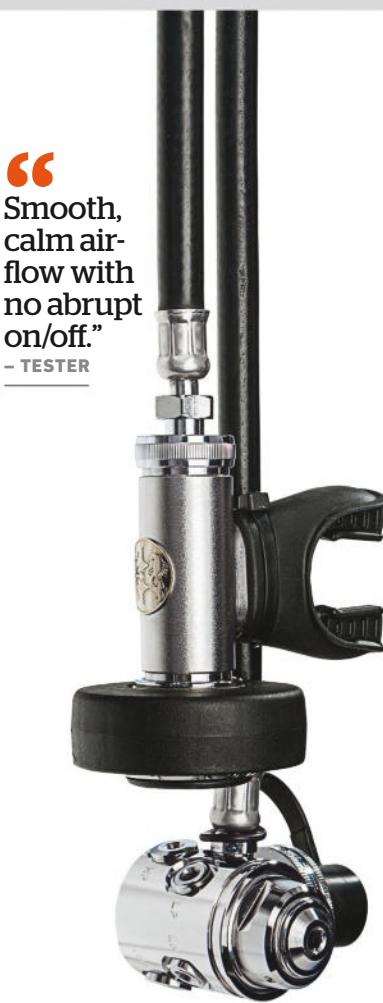
— TESTER

## MARES FUSION 52X

PRICE \$800 CONTACT [mares.com](http://mares.com)

Mares calls this “a radical departure” from other regs, and you’ll hear no argument from us. The Fusion’s unique design elements include the long, curved air-bypass tube to the mouthpiece, a purge cover that’s hinged like a trap door, and a rotating air control on the hose fitting that the manual says “works like a motorcycle throttle”—twist forward for less, back for more. Performance in ANSTI testing was impressive, with the Fusion 52X recording one of the lowest work-of-breathing scores for an excellent rating at recreational depth, and very good scores to our test limits. The reg is novel enough that test divers found that it took a bit of getting used to. Some divers loved the air control, which, when wide open at depth, seems to deliver air almost before you draw in your breath. Others found wide open too pushy and preferred to back off the throttle. Likewise the purge: It feels odd at first, but with a little use, you’re able to use it very precisely. The more we used this reg, the more we liked it.

### BREATHING SIMULATOR RESULTS



“Smooth,  
calm air-  
flow with  
no abrupt  
on/off.”

— TESTER

## POSEIDON CYKLON

PRICE \$799.95 CONTACT [poseidon.com](http://poseidon.com)

The side-exhaust Cyklon was launched during the Eisenhower administration, with nonstop updates ever since. Like its sibling the Xstream, it can be used on either the left or right side. We tested the latest version of the Cyklon Metal (the Cyklon 5000 has a plastic second stage), which, with its mix of shiny and matte metalwork and large, black diaphragm end cap, has a vintage look that verges on steampunk. In ANSTI testing, the Cyklon scored a rating of very good at recreational depth. But it was in the water that the Cyklon really shined, proving to be one of the test divers’ favorites, tying the top ergonomic scores across the board and making it to multiple divers’ top-three lists. Divers rated it especially highly for ease of breathing and dry breathing in all positions, and they liked the purge placement—which is straight rather than angled toward the rear as on the Xstream. Despite the metalwork and large diaphragm housing, the second stage is lighter than it looks, making it surprisingly comfortable.

### BREATHING SIMULATOR RESULTS



“While our test-team divers were impressed with the performance of the \$500-and-under regulators in our July issue, they found that some of the extras that come with these pricier models really are well worth it.” — Roger Roy, ScubaLab Director

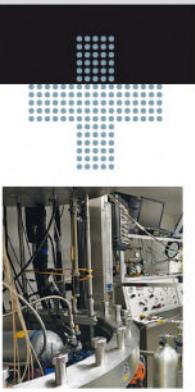
### CORRECTION



#### Seac MX100 \$480

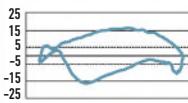
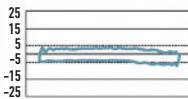
[seacusa.com](http://seacusa.com)

In our July ScubaLab review, we published an incorrect photo with our review of the new MX100 (shown here). The reg was rated very good for ease of breathing by our divers and also in ANSTI testing at recreational depth.



## Performance You Can See

The graphs below show results of ANSTI testing on the same reg at different depths and breathing rates. The loops go clockwise, starting at the right, as inhalation begins, and moving to the left, where exhalation starts. Below the centerline shows the negative pressure required to inhale; above shows the positive pressure needed to exhale, measured in millibars.



The top graph was taken at 132 feet at 15 breaths per minute, and recorded a work-of-breathing score of .73 joules per liter — excellent performance, showing it was able to deliver air at that rate and depth with little effort.

The next graph shows the same reg at 181 feet and a breathing rate of 30 breaths per minute. The denser air, higher water pressure and rapid breathing are taxing the reg, pushing its work-of-breathing score to 1.76 joules per liter — good, but a difference a diver would feel.

**Bubble clearance was very good.”**  
— TESTER

## POSEIDON XSTREAM

PRICE \$799.95 CONTACT [poseidon.com](http://poseidon.com)

The tec-oriented Xstream is currently one of only two regs approved by the U.S. Navy for cold-water use (the other is Poseidon's Cyklon). The first stage uses a design that Poseidon says reduces potential failure points by two-thirds. The Xstream has no adjustments, but test divers reported no issues with free-flows. The second stage is compact and easy on the jaw, and with its side exhaust, it works on either side (perhaps why it was rated one of the driest regs in head-down position). Divers also rated it very good for bubble interference. But while the second stage is ambidextrous, the purge is less so. Located opposite the hose and angled toward the back, it can only be easily pressed with the hand on that side, and a careless jab will kick off a blast of air that some test divers found too forceful (though a benefit of the design is it won't free-flow in a strong current or on a fast scooter.) In ANSTI testing, the Xstream earned an excellent rating at recreational depth, recording one of the lowest work-of-breathing scores in our test.

### BREATHING SIMULATOR RESULTS



**“The breathing adjustment makes a big difference.”**

— TESTER



## SCUBAPRO

### MK25 EVO/A700 BLACK TECH

PRICE \$1,129 CONTACT [scubapro.com](http://scubapro.com)

Paired with Scubapro's flagship piston first stage — the MK25 EVO, rated for cold-water use — the A700 second stage has also gotten a makeover with the Black Tech finish, a lustrous coating resistant to abrasion and corrosion. The cool finish and metal diaphragm cover give it a tough, all-business look. The reg proved capable on the ANSTI machine, where it was rated very good at recreational depth and good to test limits. Test divers rated it good for easy, dry breathing regardless of position. The Venturi lever was effective, if a little stiff. Divers also found the breathing-resistance adjustment effective, earning it a very good rating. However, some divers said the adjustment needed tuning more frequently than they liked, with relatively small changes in depth or breathing rate requiring a touch of the knob. Divers also thought the reg was noisier than average on intake, with a few finding the noise bothersome. But they liked the swiveling first-stage barrel and five low-pressure ports, which give a wide choice of hose-routing options.

### BREATHING SIMULATOR RESULTS



“  
The ad-  
justment  
really  
fine-  
tunes air  
delivery.”

— TESTER

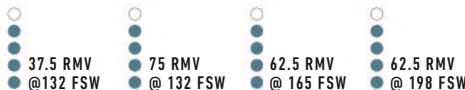


## SEAC DX200

PRICE \$650 CONTACT [seacusa.com](http://seacusa.com)

On some regs, the breathing adjustment doesn't seem to make much difference, but the new DX200 isn't one of them. With more than three full turns of adjustment, changes made a big difference, allowing test divers to dial in performance and helping the DX200 earn a very good score for ease of breathing and effectiveness of adjustment. Divers found the Venturi control well marked, easy to operate and effective at blocking free-flows. The DX200's purge cover is a large, rounded triangle that allows good control — a gentle push on one of the corners provides an easy clearing of the reg without an overly strong blast — although some divers thought it required more movement than it should have. The glossy purge cover and satin-finish metal surrounding it give the reg a refined appearance. In ANSTI testing, the DX200 was rated very good across the board at all test depths. The barrel on the balanced diaphragm first stage doesn't swivel, but the four low-pressure ports are angled at 20 and 30 degrees for additional hose-routing options.

### BREATHING SIMULATOR RESULTS



SCUBALAB  
**BEST  
BUY**  
2015

“  
Perfect-  
weight  
second  
stage —  
really nice  
and light.”

— TESTER

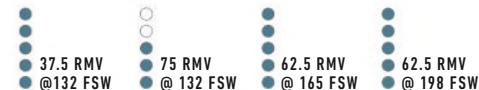


## ZEAGLE F8

PRICE \$599 CONTACT [zeagle.com](http://zeagle.com)

Zeagle's new flagship reg links to the company's heritage ("F8" is a nod to the long-running Flathead reg series), but with a different look and feel oriented as much toward comfort as performance. The second stage is compact and light, with smooth edges and soft parts. The purge cover, which takes up the whole front of the reg, is soft and rubbery, the breathing adjustment knob is a full inch in diameter and ringed with soft rubber, and the Venturi lever is one of the easiest to reach and operate we've used (and is clearly marked). Where the sprocket-like heat sink connects to the second stage, fingers are protected from scrapes by the wide, soft hose cover. Divers noticed this attention to ergonomics, and that earned the F8 top ergonomic scores in our test. It prompted test-diver comments such as "all around comfortable to use" and "everything you would want in a reg." Our ANSTI testing showed the F8 was giving up nothing in performance for the comfort, and doing it for the lowest price here, making the Zeagle F8 our Best Buy.

### BREATHING SIMULATOR RESULTS



Q: What makes a reg a favorite?

A: As you'd expect for a piece of gear as personal as a reg, test divers have varying opinions. But the regs our testers liked best had controls that were easy to use and effective (and well marked). They had second stages that were compact and didn't create bubble interference. They had purge controls that could clear the reg effectively without an excessive blast of air. And — above all else — they delivered smooth, quiet breathing with as little effort as possible.

— Roger Roy, ScubaLab Director

# TRAINING

INSTRUCTIONAL TIPS TO IMPROVE YOUR SAFETY, SKILLS AND BOTTOM TIME

## DIVE HACKS

## MAGIC CARPET RIDE

FIVE WAYS TO MAKE YOUR NEXT (OR FIRST) LIVEABOARD ADVENTURE YOUR BEST DIVE TRIP EVER

BY ERIC MICHAEL

**S**avvy divers know that liveaboards are the ultimate way to travel for maximum water time and major pampering. These floating palaces of dive lust cruise some of the most exotic and prolific regions on the planet, putting their guests into the best possible conditions at optimal times for mind-blowing encounters. When your plush stateroom and gourmet meals are bobbing gently above a world-class dive site, a vacation doesn't get much easier. All that's required is to roll out of bed and into your wetsuit, because your gear is already assembled and waiting for you, attached to a full cylinder. Consider enjoying this scenario for seven to 10 days in a row, and the fantasy that is liveaboard diving comes into clear and wonderful focus.

All of this bliss comes at a price, however. This method of travel represents a significant investment, one that frequently cashes out at a more expensive price tag than a land-based alternative. And because you're typically isolated from civilization, it pays to come prepared with a highly tuned game plan, the right equipment and a few tricks to which only liveaboard veterans are privy. To even the playing field for every diver, I asked Lauren Hill, the New Zealand-born captain of the Aggressor Fleet's *Cayman Aggressor IV*, for her



expert advice. A veteran of six years at the helm and a half-dozen more as an instructor and guide, Hill is one of the most customer-focused liveaboard hosts I've ever encountered; her advice can help you make the most of your luxury-travel investment.

### BE THE EARLY BIRD

Diving from a liveaboard means that, more often than not, you'll be anchored in a prime spot that day boats can take considerable time to

reach. And captains know how to maximize local conditions to serve up the best spots on any given day. Advantage: you. So make the most of the opportunity by rising with the sun and being there when the reef comes to life. Piloting the *CAIV* gives Hill early-bird entry to some of her favorite sites in the Caymans: "Nancy's Cup of Tea on Little Cayman as a dawn dive is always a 'wow' dive when the reef is waking up around you and the reef sharks come in close to check us out."

**DIVE HACKS** These tips will have you lovin' the liveaboard life [P 50](#)

**LESSONS FOR LIFE** Drowning with a full tank of air isn't uncommon [P 52](#)

**DIVING DOCTOR**

What are some tips for post-dive ear care? [P 54](#)

**IMAGING** Optimizing exposure by exposing to the right [P 56](#)

## PLAN TO TAKE YOUR TIME

Without the pressure land-based operators have to get their guests in the water and back on a schedule, liveaboard divers have the ultimate luxury of time. Whether you're diving from the yacht or by tender, the relaxed schedule can take some getting used to. "As all our dives are from the mothership, there is no need to take off on a mission swimming 2 miles away underwater," says Hill. "All our dives are right under the boat, so our guests can slow down and smell the roses — and relax."

## BRING A BACKUP FOR YOUR BACKUP

The glorious isolation of being on a yacht far out at sea is a fantasy many of us share. But it can quickly turn into a nightmare when equipment malfunctions and you can't hit the local dive store for that key part or replacement piece. "A big mistake our divers make is not testing their gear after having it serviced," Hill says. "First dive of the week, and we have free-flowing this and malfunctioning that and the cry of, 'But I just had it serviced.' Go for a couple of local dives at home before your trip, even if it's just in the pool." You can't always count on the boat staff to have a particular part, so a well-stocked save-a-dive kit is a must.

Hill advises that "having backup equipment if you own an unusual brand, for example, or a spare battery for your flashlight that regular batteries don't fit," can help liveaboard guests avoid missing dives when disaster strikes. "And photographers should pack backup fiber-optic cables and strobe connectors, and a backup SD card or hard drive too."

## GEAR SOLUTIONS: PACKING LIST

Capt. Lauren Hill's recommended scuba accessories and common household items to make the most of your liveaboard trip.

### » A GOOD FLASHLIGHT

Think small, bright and

rechargeable (or with plenty of extra batteries).

### » SURFACE-MARKER BUOY

Make sure you never dive without one.

### » TWO OR THREE

**SWIMSUITS** So you'll always have a dry one.

**» BATTERIES** Bring backups for your computer, camera and everything else that uses them.

**» SUNSCREEN** Nothing is worse than getting fried your first day on board, then suffering the rest of the week

## MIND YOUR CORE

With the availability of up to five dives per day, liveaboard guests can rack up serious bottom time, but they can also chill themselves to the verge of hypothermia — even in tropical waters. Being mindful of your internal body temperature can be the difference between performing at your best and shivering in discomfort. "I always encourage guests to get completely dry and changed between dives," Hill says. "Your core temp will warm up faster, and you will probably stay warmer and enjoy the next dive even more."

## MAKE THE BEST OF CLOSE QUARTERS

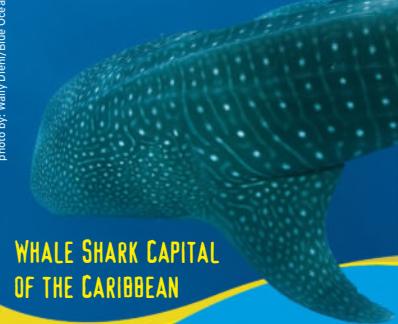
You'll be on board with the same group of strangers for an extended period. Even though a common love of diving is a great icebreaker, Hill has seen enough good and bad chemistry experiments to pick up a few best practices. "There are a few key ways to make friends or just get along when you are on a yacht for a week or more," she says. "In your cabin and on the dive deck, keep your belongings, equipment, and diving and photo gear all in your space. Don't be that guy or gal who takes over the cabin or the dive deck with all of your worldly possessions."

Hill's final piece of advice: "Try not to be a know-it-all," she says. "It's great that you are enthusiastic and you have all of this knowledge to share, but don't force it upon your fellow divers — you'll only drive them away. Move around the group, sitting with different people at mealtimes, and just be social. Best of all, just relax, bring a sense of humor and enjoy the ride."

photo by: Wally Dishi/Blue Ocean Ink

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# MINOR ISSUES, MAJOR CONSEQUENCES

DIVER DROWNS WITH FULL TANK OF AIR **BY ERIC DOUGLAS**



**A**nn and Bill were really getting into scuba diving. It was everything they had imagined it would be, and more. They were diving at a local quarry, and conditions were good overall. When they reached the platform 60 feet down, Ann noticed Bill was having trouble with his weight belt and moved in to help him out. She didn't expect it to be a problem. Fighting with the belt and his gear, Bill twisted to one side and knocked Ann's regulator from her mouth. Things went downhill from there.

## THE DIVERS

A new diver, 24-year-old Ann was in good health. She had made 15 dives total, including four from her initial certification seven months earlier. She

tried to get to the local quarry every month to keep practicing with her dive buddy, Bill, whom she met in dive class. They had become fast friends, and Ann was happy to have a dive buddy with a similar experience level and interests. They were both excited about dive-travel opportunities and

taking additional training. Both divers were using a mixture of rented and personal gear. They were buying pieces as they could afford it.

## THE DIVE

Conditions that morning were comparable to what they had learned in. The water was cool — typical for the end of the dive season — and Ann and Bill were able to wear their normal wetsuits.

They planned to make a fairly typical dive for the quarry. They were going to swim out to a marker buoy on the surface and then descend to a platform 60 feet down. From there, they planned to work their way into shallower water, exploring some of the sunken attractions in the quarry. They had made the same basic dive several times before.

## THE ACCIDENT

When Ann and Bill arrived at the platform, Ann noticed Bill was having trouble with his weight belt. He immediately kneeled on the platform, trying to get things under control. After watching Bill struggle for a minute, Ann moved in close to try to help him out. She was getting cold from sitting still on the platform and wanted to move the dive along.

Bill's BC was loose and moving out of place as he tried to get his weight belt buckled. Ann approached Bill just as he twisted to the side, slinging his BC around. The sudden movement knocked Ann's regulator from her mouth. Realizing what had happened, Bill immediately tried to help Ann recover her regulator. In the process of helping her, his weight belt came loose and dropped to the swim platform behind him. Bill immediately began floating toward the surface, and his weight belt was out of reach before he realized it. He began struggling to get back to the bottom, but in the process, Bill lost a fin and his tank came loose

## LESSONS FOR LIFE

**1 PRACTICE EMERGENCY SKILLS** Take the time to practice emergency skills regularly. This includes mask removal and replacement and regulator recovery. These basic skills can turn a potential disaster into a minor problem that won't end a dive.

**2 BE FAMILIAR WITH YOUR EQUIPMENT** Whether you are diving with something new or with rented gear, be familiar with your equipment, and your buddy's. Know where the weight buckles are, and how to adjust and release them.

**3 TAKE A BREATH** When a problem arises, stop for a moment and take a breath. Think about how to handle the problem, and then act. It could save your life.

from his BC. He ascended all the way to the surface and was unable to descend again. When he realized Ann wasn't right behind him, he signaled to the shore for help. Two nearby divers responded quickly, but they didn't find Ann for 15 minutes. When they finally located her, she was unconscious and her regulator was still out of her mouth.

On the surface, the rescuers began resuscitation efforts, but they were unsuccessful. Ann's autopsy indicated she had drowned.

#### ANALYSIS

On the face of it, some might suggest that this dive accident was caused by dive equipment. In reality, the accident was caused by the failure to properly use the equipment and respond to the problem. In the book *Scuba Diving Safety*, Dan Orr and I quoted Dr. George Harpur, medical director of the Tobermory Hyperbaric Facility in Ontario, Canada. He said, "We are not able to document a single case in which equipment failure directly caused a diver's death or injury.

---

#### ANN APPROACHED BILL JUST AS HE TWISTED TO THE SIDE, SLINGING HIS BC AROUND. THE SUDDEN MOVEMENT KNOCKED ANN'S REGULATOR FROM HER MOUTH.

---

It has been the diver's response to the problem that results in the pathology."

Every diver has had a problem with a piece of equipment at one time or another. As the saying goes, "If you haven't had a problem, you aren't diving enough." The key to problem management is to respond quickly and calmly, and then move on. Losing control is the key to making a simple problem escalate into a bigger one. Bill was growing frustrated with his weight belt, and probably a little nervous. He was so fixated on his problem that he didn't see Ann coming toward him. When she tried to help, his jerky movements knocked her regulator from her mouth. At this point, both divers were having problems, but neither problem was insurmountable.

Ann could have moved back, recovered her regulator and then signaled Bill to stop so she could help him. That didn't happen.

A recurring theme in this column is the human reaction of panic. When panic sets in, so do perceptual narrowing and tunnel vision. This limits your reactions, keeping you from calmly thinking through a problem. Ann and Bill both panicked. Ann failed to recover her regulator (something every diver learns to do), and then failed to make an emergency ascent to the surface. Instead, she simply froze on the bottom and drowned with a mostly full supply of air on her back. Bill panicked when he lost his weight belt, and his efforts to get back down to the bottom grew more and more erratic, causing him to lose a fin and dislodge his tank.

Many divers never practice the emergency skills they learned during their initial training. They don't review recovering a lost regulator or removing and replacing their weight belts. Both of these basic skills could have saved the dive, allowing both divers to continue on after a brief interruption. It easily could have turned out as something to laugh about later — just a minor blip.

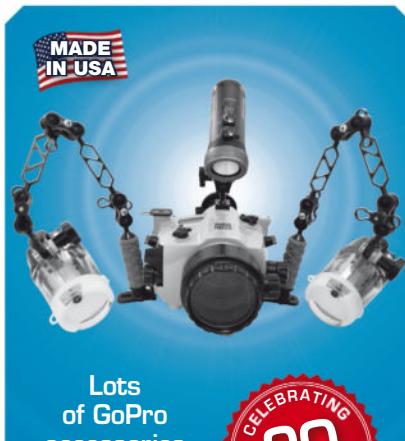
It is possible that Ann and Bill were using unfamiliar equipment, because some of their gear was rented. When that's the case, it is even more important to take a few minutes at the beginning of the dive to review your equipment — and your buddy's — to make sure you know where everything is located and how it works.

Ann drowned on the bottom of the quarry, with plenty of air in her scuba tank. Drowning does not always mean the person inhaled large quantities of water; often the drowning victim only inhales a teaspoon of water. This causes the larynx to spasm and close, and that involuntary reaction causes suffocation.

The autopsy didn't include detailed information on Ann's lungs, but it is possible that in her panic she inhaled a splash of water and then lost consciousness. If she'd had a laryngospasm, it would have made it almost impossible for her to take a breath.

» Eric Douglas co-authored the book *Scuba Diving Safety*, and has written a series of adventure novels, children's books, and short stories — all with an ocean and scuba-diving theme. Check out his website at [booksbyeric.com](http://booksbyeric.com).

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### TRAINING

## DIVING DOCTOR

# GETTING AN EARFUL

WHY DIVERS EXPERIENCE  
“FULLNESS” IN THEIR EARS

JAMES L. CARUSO, M.D.

**Q: MY EARS ARE ALWAYS “FULL” AFTER A DIVE. DO YOU HAVE SOME TIPS FOR POST-DIVE CARE?**

**A:** Perhaps second only to the lungs, the ears are extremely important organs when it comes to diving. The inability to equalize pressure between the middle ear and the environment will keep you on the surface every time. Because the outer ear is exposed to the environment, infections are quite common.

The usual reason for ear “fullness” after a dive is inadequate pressure equalization during the dive. You might be equalizing enough to make it through the dive, but the eardrum might be undergoing mild trauma that will persist as pain or fullness after surfacing. The best way to keep your tympanic membranes happy is to begin gentle equalizing maneuvers immediately after leaving the surface, and clear regularly and frequently during a slow, gradual descent. It’s a good idea to begin equalizing on the surface and assessing if all feels well, even before experiencing any pressure changes. Taking over-the-counter decongestants prior to the dive has been shown to be effective.

Infection is another major issue. Certain bacteria thrive in wet environments and can cause a serious and painful infection known as otitis externa. Antibiotic drops and abstinence from diving are required once infection is present. Prevention includes good ear hygiene such as avoiding any scratches or other breaks in the skin surface lining the ear canal (earplugs and cotton swabs frequently cause trauma). The use of weak acetic acid (vinegar) solutions before and after diving might decrease the risk of infections by eliminating the bacteria and drying the canal.

► James L. Caruso is a 30-year veteran of the U.S. Navy, serving as ship's doctor, undersea medical officer and flight surgeon. His experience includes a fellowship in Diving and Hyperbaric Medicine at Duke University Medical Center; today he is Denver's chief medical examiner.

## EIGHT TIPS TO IMPROVE UNDERWATER NAVIGATION

SO YOU NEVER AGAIN HAVE TO WONDER, "WHERE'S THE BOAT?"

BY SCUBA DIVING STAFF



Ever gotten so absorbed underwater that you suddenly weren't sure where you were? These tips will help. (Find a wealth of training info at [scubadiving.com/training](http://scubadiving.com/training).)

**1 BRIEFING, BRIEFING** Pay attention to your divemaster's briefing. If you're diving on your own, get a map and gather all the local info you can.

**2 WHO'S IN CHARGE?** Decide who will lead, as the other person will monitor time, depth and distance.

**3 PAY ATTENTION** Natural navigation — using underwater topography as opposed to a compass — starts as soon as you get wet. Look around.

**4 TICK, TOCK** Plan how long you will swim away from your starting point so that you know how long to expect on return. Head into the current on the way out.

**5 THIS LOOKS FAMILIAR...** If there's a sand channel or reef edge, use it as a guideline. Note landmarks and the angle of the sun.

**6 COMPASS CHECK** If you don't have a compass, get one, and become comfortable with it. Practicing on dry land first can help you get comfortable.

**7 WHAT'S THE RUSH?** Going slowly means you might not be as far from the boat as you think.

**8 HEADS-UP** If all else fails, make a safe ascent to the surface and have a look around.

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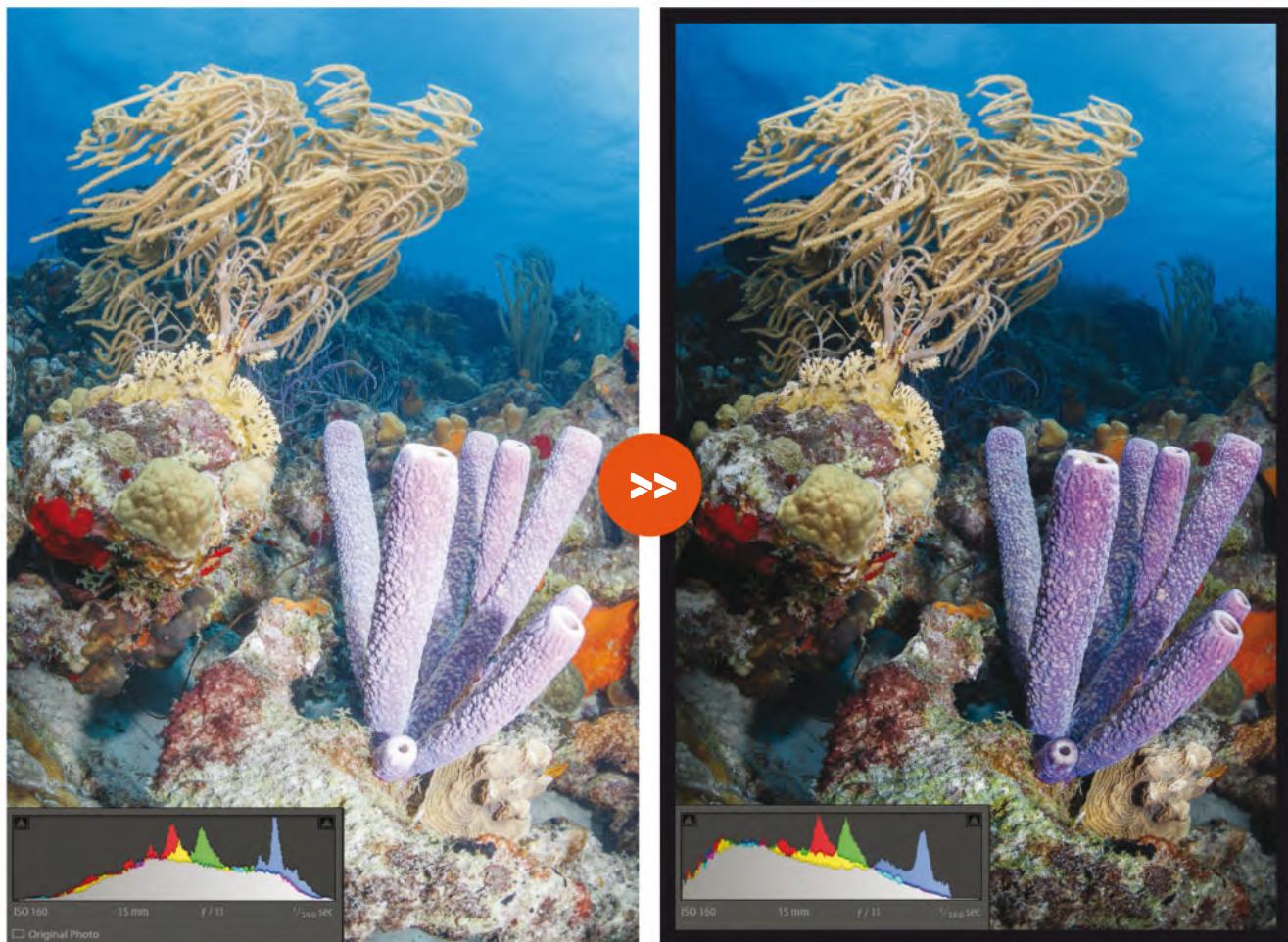


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**TRAINING**  
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## EXPOSING TO THE RIGHT

YOUR CAMERA'S HISTOGRAM IS ONE OF YOUR BEST TOOLS  
TEXT AND PHOTOS BY ERIN QUIGLEY

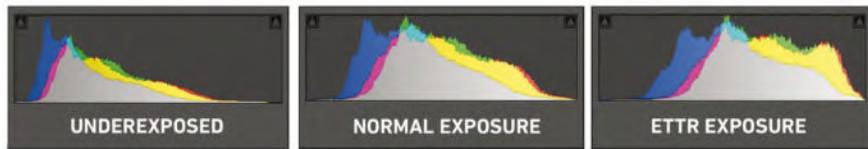
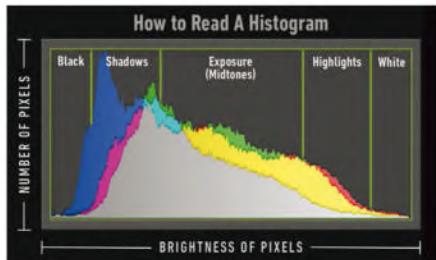
If you're not already shooting with the help of your camera's histogram, it's time to start. A histogram is a graph that shows the distribution of tonal values from black to white in your image, and it's a very accurate indicator of overall exposure. If you're not checking out the histogram as you shoot, your exposures are a guess at best.

### ALL DATA ARE NOT COLLECTED EQUALLY

ETTR (exposing to the right) is a RAW-image-capture technique that increases the exposure of an image in order to maximize the amount of data collected by the camera's sensor.

Because digital-image sensors collect 50 percent of all available data in the single brightest stop, underexposing your photo by even a small amount is tantamount to tossing a significant amount of information out the window. An underexposed shot often looks just dandy on the back of the camera, but in fact, the LCD preview is a terrible predictor of exposure. Use the histogram to analyze what kind of exposure you're capturing with each shot.

For the sake of this example, let's say that a camera has five stops of dynamic range (from darkest to brightest) and shoots a 12-bit RAW image, which is capable of record-

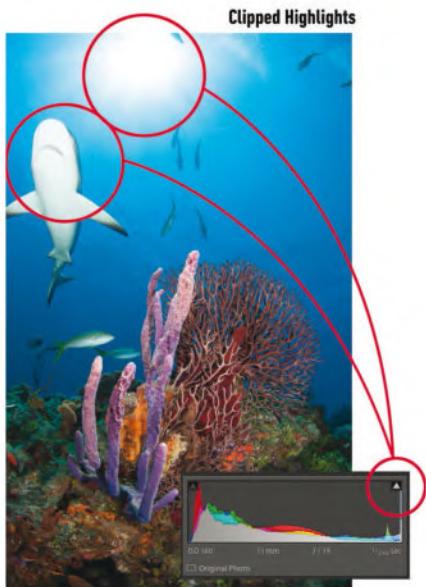


**TIPS ON READING A HISTOGRAM** Unlike your LCD screen, the histogram doesn't lie about the exposure of your photo. It's a bar graph of the pixels in the image, black on the left and white on the right. The height of the graph describes the number of pixels at each brightness level. When the graph touches the right or left side, the data is "clipped," meaning completely black or white. For underwater shooters, the red histogram represents strobe or sunlight.

ing a total of 4,096 tonal values. You'd think that each of the five stops should be able to record 850 tones — about a fifth of the total — but that's not how it works. In reality, the brightest stop (farthest to the right on the histogram) collects a weighty 2,048 values, with each subsequent stop to the left (darker) recording half the amount of the previous one. In short, the right side of the histogram holds the data, and the left side holds the noise.

### WHEN TO USE ETTR

This technique isn't something you'll necessarily use on every shot. It's not easy to use the ETTR technique when the dynamic range of the camera is already pushed to its limits; for instance, when shooting sun balls or other ultra-high-contrast scenes. ETTR pays off most in moderate- and low-contrast shooting scenarios, where the ultimate goal is to bias your exposure brighter, with the histogram snugged up to the right, but not so far to the right that the highlights get "clipped" by running into the right edge.



When the scene's contrast (light to dark) pushes or exceeds the dynamic range of the camera, ETTR might not be possible. The idea is to push the histogram as far to the right as possible without clipping (blowing out) highlights.

### DON'T OVERDO IT!

Pay close attention to the camera's highlight-warning "blinkies." When you see them start to flash, it's time to back off. They're a friendly reminder that you may be in danger of blowing out highlights. Specular highlights, which are reflections of light from shiny surfaces like water, fish scales and critter eyeballs, might

not contain enough critical detail to worry about in small amounts, but completely obliterated highlights are not recoverable and spell doom for your picture. A little clipping is OK; a lot is bad.

### BASIC POST WORK FLOW FOR ETTR RAW CAPTURES

All ETTR images need work in post. Right out of the camera, ETTR captures often appear washed out or overexposed. All those yummy tones in the brightest part of the image need to be mashed back toward the left of the histogram in order to restore richness, saturation and contrast to the shot.

Remember, the Highlights and Shadows sliders are detail sliders meant to restore detail in bright or dark areas without affecting clipping. The Whites and Blacks sliders establish the actual white and black points in your photo.

- 1 In the Basic panel, slide the Highlights slider all the way left.
- 2 Slide Exposure toward the left to lower the overall brightness level.
- 3 Add Contrast if necessary.
- 4 While holding down OPT (Mac) or ALT (PC), click on the handle of the Whites slider. You'll see a black-clipping preview screen. Slide the handle toward the right until you begin to see small areas of color. Slide back toward the left until just the tiniest pinpoint of light pixels remains. Those light pixels are the white point in your image.
- 5 Slide the Shadows slider to the left until the shadow details are as you desire.
- 6 While holding down OPT (Mac) or ALT (PC), click on the handle of the Blacks slider. You'll see a white-clipping preview screen. Slide the handle toward the left until you begin to see small areas of color, then slide back toward the right until just a smidge of dark remains. Those dark pixels represent the black point in your image.
- 7 Re-adjust any of the Basic panel sliders as needed.
- 8 Move on to the HSL panel (Hue, Saturation and Luminance) and local tools.

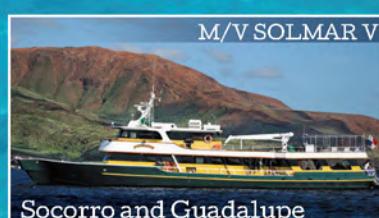
» Erin Quigley is an Adobe ACE certified digital-imaging consultant and an award-winning shooter. [GoAskErin.com](http://GoAskErin.com) provides custom tutorials and one-on-one instruction for the underwater photographic community.

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# TIME PASSAGES

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BUT NOT THE  
MAGIC OF OC-  
TOPUSES, SEA  
LIONS AND THE  
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BEAUTY OF BRIT-  
ISH COLUMBIA



TEXT AND PHOTOS BY BRANDON COLE

**E**very diver remembers his first time. My baptism in British Columbia waters was 25 years ago, in Discovery Passage. The midwinter plunge at a site called Whiskey Point opened my eyes to just how great cold-water diving could be. Granted, I nearly froze to death. (You would think with 1,000 dives under my belt I would have known better than to wear a ratty, old hand-me-down wetsuit. Chalk it up to the follies of youth and the poverty of a college student.) I survived, emerging from the emerald seas stuttering excitedly about the remarkable color, the diversity of life and the magic of wolf eels.

## BACK TO THE FUTURE

Flash forward to February 2015. I smile to think that seminal voyage to British Columbia's Vancouver Island began much like this one. I've just convinced the border agent that, yes, the purpose of our visit to Canada in the middle of a gray winter drizzle is indeed scuba diving, that we'd be taking

**Steller sea lions are eager to play with divers visiting British Columbia's Norris Rocks.**

only pictures, leaving only bubbles. Our little car is stuffed to the gills with dive gear, tanks clinking merrily at each turn in the road. We're making a beeline for the Tsawwassen ferry, which will whisk us across to Vancouver Island. We'll arrive at Campbell River in four hours and be underwater in the morning. Tunes are blaring. Life is grand.

## TIMING IS EVERYTHING

Tapping his smartphone, Bill Coltart consults his favorite app and then announces that the time is nigh. "Slack should be in about 10 minutes. Make your final buddy checks and hang tight. We'll move the boat into position." Coltart, owner of Pacific Pro Dive, gently nudges his 30-foot, custom-built aluminum *Ata'Tude* close to the rocks, then stares intently downward, reading the gray-green water. Even with a lifetime of midisland ocean experience, he admits that predicting slack water in Discovery Passage — the interval between tides when water movement is at a minimum — is part science, part experience, and part adapt-on-the-fly.

Thankfully, we nail it at Whiskey Point. Dropping

down a series of rocky steps carpeted in bright-yellow sponges and strawberry sea anemones, I'm amazed once again that such tropical hues exist in the cool Pacific Northwest. At 70 feet, my computer shows 47 degrees, but who cares? (This time, we have drysuits.) Hulking lingcod are lounging about, begging to be photographed. A Puget Sound king crab clammers past like a Technicolor Humvee on a mission.

My plan is to keep moving south in hopes of finding my wolf eels of memory. But we are waylaid by a giant Pacific octopus. It's a pipsqueak, no bigger than my fist. This little guy is all attitude, launching off the wall and squirting a cloud of ink to bamboozle us. My wife, Melissa, sees

through his anemic smoke screen and follows him down to 80 feet, where he settles on a pink-coralline-algae-covered rock and does his best sea urchin imitation. Unfortunately, a building flood tide 30 minutes later encourages us to ascend. As soon as we break the surface, I begin babbling about the remarkable color, the diversity of life, and the magic of the octopus.

### A CURRENT-POLISHED JEWEL

Vancouver Island's bulk does a splendid job sheltering Campbell River's dive sites from open-ocean storms and the punishing Pacific swell. Currents, however, can scream through these inland waters — up to 16 knots

in Seymour Narrows, just north of town. Current is the region's lifeblood, a conveyor belt bringing nutrient-rich, oxygenated seawater and plentiful food to marine life large and small. It's no surprise that Seymour Narrows is a superb dive whose sheer walls are plastered in a kaleidoscope of anemones and sea stars.

Along the Quadra Island side of the passage, at Row and Be Damned, we make a leisurely, hourlong ramble in 55 feet, over boulders smothered in billions of red anemones. We discover kelp greenlings zinging back and forth, nudibranchs, weird scaled crabs, and a reclusive tiger rockfish, all amid ruby splendor. Our submersion coincided with the calm of

slack water between modest tidal exchanges — otherwise, we would have sucked through our air in a few moments fighting against Poseidon's sea wind.

Day two finds us weaving beneath the Argonaut Wharf, a forest of pilings from which ghostly plumose sea anemones sprout, and under which critters creep and scuttle about. Accessible by shore or boat, it's an excellent place to encounter octopuses in less than 40 feet. Second slack is reserved for Steep Island and its garden of giant feather duster tubeworms starting at 50 feet and cascading past 100. Quillback rockfish hover near their purple, pompom-like blooms, and divers with eagle eyes will spy outrageously painted candy-stripe shrimp under the tentacles of snakelocks anemones.

One of the few sites accessible while current is running is the HMCS *Columbia*, a 366-foot destroyer sunk by the Artificial Reef Society of British Columbia in 1996. Well prepared, with plenty to see between 60 and 120 feet, it's a good intro to B.C. wreck diving. For the nocturnal, a night dive in Quathiaski Cove provides an opportunity to poke around the shallows, hunting for micro beasties.

### STELLER SHOW

On our final day, we drive over an hour south into Comox to meet up with Coltart again at the municipal marina. We transfer gear onto *Fast Forward*, his ex-Coast Guard Zodiac, and greet our dive mates, filmmakers Russell Clark and Trisha Stovel, on assignment for seaproof.tv.

Under leaden skies, we race along at 20 knots to Norris Rocks, just off Hornby Island. The raucous barking and the smell offer irrefutable proof that we've arrived. Hundreds of huge Steller sea lions shamble about on the low-lying rock.

## ITINERARY B.C., CANADA

### DAY ONE

Feast on the loggers breakfast and morning glory muffins at **Ideal Cafe**. Dive. Dive again at an off-slack site like the **Columbia**. **Dick's Fish and Chips** is a no-brainer for grub to refuel yourself for the third tank. Dive. Afterward, enjoy authentic Greek and primo steaks at **Acropo-lis Kuizina**. Sleep very soundly.



### DAY TWO

Between today's two slack dives visit the **Museum at Campbell River** to immerse yourself in the thousands-year-old art, culture and history of the First Nations coastal peoples. Picnic under a seaside totem pole. When you climb out of your suit after the last dive, head to funky **Freddie's Pub** to meet other scubakind over wings and brew.

### DAY THREE

Use this as a wild-card day to customize your getaway. Be harassed by sea lions, do additional dives at premier sites such as **April Point Wall** and **Copper Cliffs**, or become one with salmon in the **Campbell River**. Mountain bike in **Snowden Demonstration Forest**. Watch grizzly bears and whales with Aboriginal Journeys, or shred the slopes at nearby **Mount Washington**. Let the season — and your style — decide.

### NEED TO KNOW

**WHEN TO GO** Diving Discovery Passage is possible year-round. Visit between November and April to add sea lion dives at Mitlenatch Island or Norris Rocks. From August to October, join Pacific Pro Dive for a drift snorkel down the Campbell River to witness mighty Pacific salmon concluding their epic journey to spawn and die.

**DIVE CONDITIONS** Sea temperatures range from 45 to 55 degrees, and visibility 20 to 80 feet.

Winter generally delivers the best viz, and summer and fall the best topside weather and warmest water. Drysuits or thick semidry wet-suits are strongly recommended. Dive with experienced locals, use a live boat, plan submersions for slack water, and be wary of boat traffic, especially during summer.

**OPERATORS** Pacific Pro Dive ([pacificprodive.com](http://pacificprodive.com))



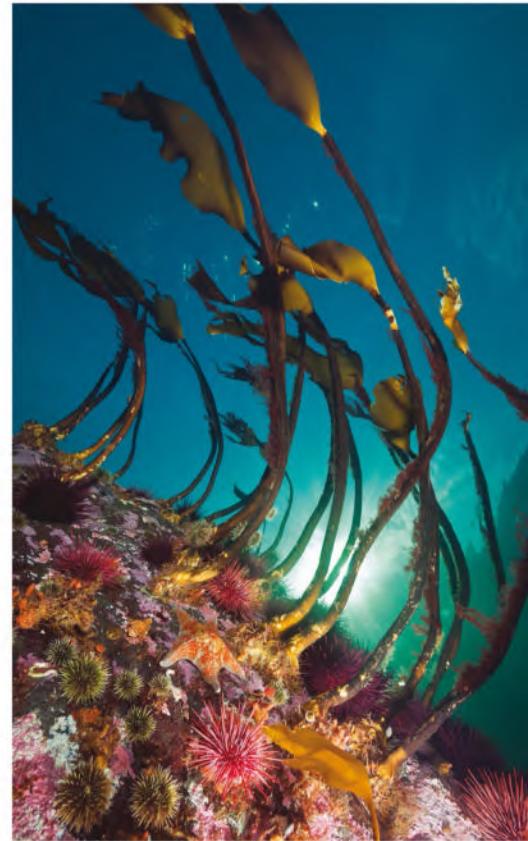
**PRICE TAG** Custom charters are from \$99 to \$120 (Canadian) for two-tank air dive charters.



Coltart smiles, asking, "Ready for the full-contact action to commence?" Trisha chimes in: "It's like running around the woods among a massive wolf pack that uses newcomers as chew toys — in the friendliest way possible!"

We back roll into the green. Silence greets us. As do 50-odd marine mammals, eager to play. At first, the sea lions politely swim around us at arm's length, tilting their heads like curious puppy dogs and ogling us with dreamy eyes. Minutes later, they're mobbing us. They cuddle, lean heavily on us, and take "exploratory" bites, mouthing our arms and legs. They nuzzle against my camera, pull at coiled strobe cords and nibble our fins. If you don't fancy being in the middle of an underwater rugby scrum, consider skipping this dive.

Two hourlong dives pass too quickly, and the boisterous throng seems truly sorry to see us go. We will dearly miss the sea-lion loving.



**At sunset, Seymour Narrows is beautiful topside (top), but below the surface, fierce currents can reach 16 knots. However, diving in Discovery Passage yields diverse marine life, including wolf eels peering out from their dens (above left) and candy-colored kelp carpeting the passage's walls (above right).**



TOP 100

## FRENCH POLYNESIA



BY TERRY WARD

THIS PACIFIC PARADISE SNAGGED BEST OVERALL DESTINATION, BEST OVERALL DIVING, BEST MARINE ENVIRONMENT AND MORE IN OUR 2015 TOP 100 READERS CHOICE AWARDS

**H**oneymooners who arrive at the over-water bungalows of Bora Bora and Moorea are convinced they've found Eden. But what most of their blissed-out ilk never realize

is they've hardly scratched the surface when it comes to all there is in *fantastique* French Polynesia. Divers, of course, are more clued in. Collectively known as the islands of Tahiti, this

volcanic archipelago of 118 islands and atolls includes five island groups, and covers a swath of the Pacific as large as Western Europe. From bejeweled reefs to ripping passes blitzed by pelagics, it's a lot to take in. Here's a head start on where to get wet.

### Shark Central

Many dive destinations can claim sharks, but it's hard to think of one that delivers them in the insane abundance of the Tuamotu atolls, the largest of the five island groups, where walls of sharks are the norm. During drift dives in Rangiroa's Tiputa Pass and Fakarava's Tumakohua Pass, hundreds of gray reef sharks congregate on the

atoll's outer wall like puzzle pieces in a toothy jigsaw, and silvertips and whitetips make appearances too. "My dive buddy wasn't lying when he said, 'Ain't nobody gonna out-shark us,'" remembers San Diego diver Mark Guinto, who traveled to FP for what turned out to be the sharkiest dives of his life (gray sharks, lemon sharks, whitetips, silvertips and more). "Almost everyone was there to dive with sharks, and there were several species of them in great number," says Guinto. Great hammerheads also are spotted fairly regularly at the passes, and tiger sharks make appearances too — making it easy to see why FP also took top honors for Best Big Animals.



and the Opunohu canyons of Moorea to Fitii pass in Huahine in the Society Islands (a calmer version of a Tuamotu-style drift), a wide-angle lens is your best friend for capturing walls of sharks, schooling jacks, mantas, dolphins and the like. "There is nowhere on Earth that compares to the stunning atolls of the Tuamotu chain when it comes to reef shark photography," says Mike Veitch, an underwater photographer based in Bali. "The clear water and amazing abundance of sharks there is unmatched anywhere."

### Migrating Humpbacks

From mid-July to late October, visitors to Rurutu in the Austral archipelago (the southernmost group in French Polynesia) are treated to one of the ocean's most awe-inspiring experiences — the chance to snorkel alongside humpback whales and their babies, drawn to the shallow, sheltered waters as a stopover on their migration path to Antarctica. Whaling stopped on this lagoonless island in the 1950s, and whale-watching tourism

and snorkeling tours have brought a new livelihood for the people living here. The seas can be rough at this time of year, and visibility can be compromised, but when you find yourself finning alongside one of the gentle giants that come here to reproduce, calve and nurse their young, you'll be left humbled for life.

### NEED TO KNOW

#### WHEN TO GO

You can dive year-round in French Polynesia, but it's rainier during the Southern Hemisphere summer, from November to March.

#### TRAVEL TIP

If you're coming from the East Coast, consider staying a night in Los Angeles on your way to Tahiti. That way, you will arrive refreshed and ready to dive.

#### DIVE CONDITIONS

Visibility in French Polynesia can reach up to 150 feet, and the water temperature averages 80 degrees.

### Pelagic Paradise

Coastal and open-ocean pelagic species abound in French Polynesia, and therein lies the excitement of diving here — you never know when a great hammerhead, manta ray or tiger shark will go cruising past you. On the pearl-farming coral atoll of Manihi, mantas can sometimes be seen carousel-feeding in about 30 feet of water at the dive site called the Circus. Jacques Cousteau's explorations in Tikehau in the Tuamotus found a higher concentration of species there than anywhere else in French Polynesia (he called the atoll the richest on Earth). Tikehau remains a pelagic gold mine for shoaling barracuda, manta rays and the usual shark denizens. And on Rangiroa, a veritable underwater Serengeti awaits. "The concentration of colors and species was a sensory overload," remembers Katharyne Daughtridge Gabriel, a diver who lives near London. "We saw gray sharks, whitetip sharks, barracudas, manta rays. And on the exit, I remember thinking, 'I just

### Wide-Angle Wonderland

French Polynesia's dazzlingly clear seascapes are to wide-angle photography what Lembeh is to a macro lens: the dream destination for clicking the shutter on some of the world's most singular underwater moments, earning FP the No. 2 spot for Best Underwater Photography in the Pacific and Indian Ocean region. Excellent visibility that consistently surpasses the 100-foot mark enhances your photos, with ambient light a particularly saturated shade of blue. From the plunging walls of the Tuamotu passes

FROM TOP: MICHAEL AW; JODI COBB/NATIONAL GEOGRAPHIC CREATIVE

**Schooling sharks in Fakarava (top). Bora Bora lures divers with a lush topside and shimmering lagoon.**





floated through Jacques Cousteau's dreams."

### Ripping Drift Dives

Drift dives are a bit of a misnomer for the experience that awaits when you find yourself aviating through the famed atoll passes of Rangiroa, Fakarava and Tikehau in the Tuamotus. Sites like Tiputa and Avatoru passes in Rangiroa and Fakarava's famed south pass, Tumakohua, are considered advanced dives due to the strong tidal currents pushing you into the lagoon that range between 3 and 8 knots. (Plan some refresher-level drift dives on Huahine in the Society Islands if you're out of practice.) "It felt like I was flying next to a mountain-side," remembers Guinto, a pilot who teaches military parachuting, of a dive at Tiputa Pass. "As a sky diver, I've had similar sensations." Indeed, if any diving experience approaches the sensation of aerial acrobatics underwater, it's the roaring passes of the Tuamotus — one reason FP was lauded as Best Advanced Diving in its region.

### Pearl Farms

One of the pleasures of French Polynesia is shopping for Tahiti's famed black pearls — which come in many sizes, shapes and colors, from black to shades of green, blue, bronze, aubergine and even pink — at a local pearl farm. At destinations such as Rangiroa and Tikehau, you can borrow a bike from your dive resort and pedal along sandy lanes fringed with palms to inspect the goods, or take a tour at farms such as Gauguin's Pearl in Rangi or Fakarava's Pearls of Havaiki.

### The Land of Gauguin

The goal is to spend as much time as possible underwater, but some of the planet's

## TOP 100 FRENCH POLYNESIA

### DRINK

One of the best wine lists in French Polynesia — heavily French, of course — awaits at the new Moorea outpost of **Le Coco's**, opened in March 2015 in Haapiti (lecocostahiti.com). Try the three-course sampler option to get a wider range of tastes.



### EAT

For dining on the (relatively) cheap, alongside locals in Papeete, look for food trucks called **roulettes**. Skirted with picnic tables, they serve things like grilled mahimahi and French-style crepes and steaks. Can't decide which? Look for the most crowded.



### SLEEP

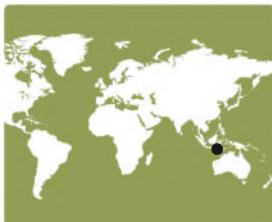
Mingle with big-wave surfers and kite surfers who also enjoy diving at **Ninamu Resort** (motuninamu.com) on Tikehau. The property has six bungalows and is completely off the grid, producing its own solar power and filtering its drinking water.



**The wreck *Les Trois Epaves* beckons off Tahiti (above); from mid-July to late October, visitors to Rurutu in the Austral Islands can snorkel with migrating humpbacks (opposite).**

most jaw-dropping tropical landscapes — old volcanoes glinting with rainbows and emerald slopes lapped by perfectly peeling waves — make any time spent topside a treat too. From the mist-carpeted mountains of the Marquesas, where the French artist Paul Gauguin spent his final years, to Moorea's lush *Route d'Ananas* (Pineapple Route), best explored by scooter, and the iconic extinct volcanic peaks of Mount Pahia and Mount Otemanu on Bora Bora, you'll need extra memory cards. Add to all that lushness the barren beauty of the atolls — sandy rings lapped by turquoise water and dotted with tiny *motus* (islets) that materialize as you descend toward the Tuamotus — and it's visual overload in the very best sense, making it clear why readers named French Polynesia Best Overall Destination. "Everything feels exaggerated in its beauty," remembers Janet Malin of time spent snorkeling with sharks and rays in Moorea's lagoons. "The electric green of the land, fuchsia flowers, water this crazy royal blue, even the locals' tattoos."

# RITE OF PASSAGE



**KOMODO DANCER'S ROUTE THROUGH INDONESIA IS AN ALMOST SPIRITUAL RITUAL FOR A REASON — OR, RATHER, DOZENS OF THEM**



TEXT BY BROOKE MORTON PHOTOS BY SCOTT JOHNSON

**A** train of four giant mantas charges overhead, and it's not a freak encounter. The site's full name is Manta Alley, but superstition has local guides simply calling it the Alley lest the wonders fail to appear, which is rare. Right now, 15 of them — each roughly 12 feet across — are winging laps around Langkoi Rock, a craggy pinnacle off the south side of Komodo, the Indonesian island best known among nondivers for dragons. As for the mantas, they're here when cold water is, pushing in plankton. And the action is nonstop.

Being in the shadow of beings so large and powerful is humbling. It's why Noh Atta Abola, steering mate of the M/V *Komodo Dancer*, is kneeling on the sand, arms overhead. He can't help the visceral gesture of awe.

The big stuff, from mantas to mola mola, is just part of the reason experienced divers consider Indonesia — and this luxury vessel — the trip of a lifetime. It's a reward best appreciated after countless hours logged over reefs, learning to identify enough fish species to appreciate the record-setting biodiversity of this underwater Amazon. Moreover, participants need skills honed for the sometimes challenging conditions, from down-currents to drift dives ending in open water.

The 10-day voyage I've just begun starts on the island of Flores, 36 hours by boat if traveling nonstop to the end point of Bali, itself a destination most lengthen their trips to experience. Before I embarked, I had wanted to revel in the magic of the place, devoting a week to touring the incense-heavy temples —

local myth alleges Bali has a thousand.

The dive trip will be a whirlwind. The itinerary promises a parade of wonders so large it'll take work to keep pace, and so small it's a hunt to acknowledge their presence. I imagine it'll feel much like standing before the ornate temple altars — like what Abola experienced today: a feeling of awe so overwhelming you can't help but be brought to your knees.

## NIGHTLY SHOWINGS

It's just after sunset, and Rob Morgan-Grenville is briefing us on a site called Circus, supposedly one of the trip's best night dives. But after he uses the words *sand, rock and coral rubble*, I debate tugging on a damp wetsuit.

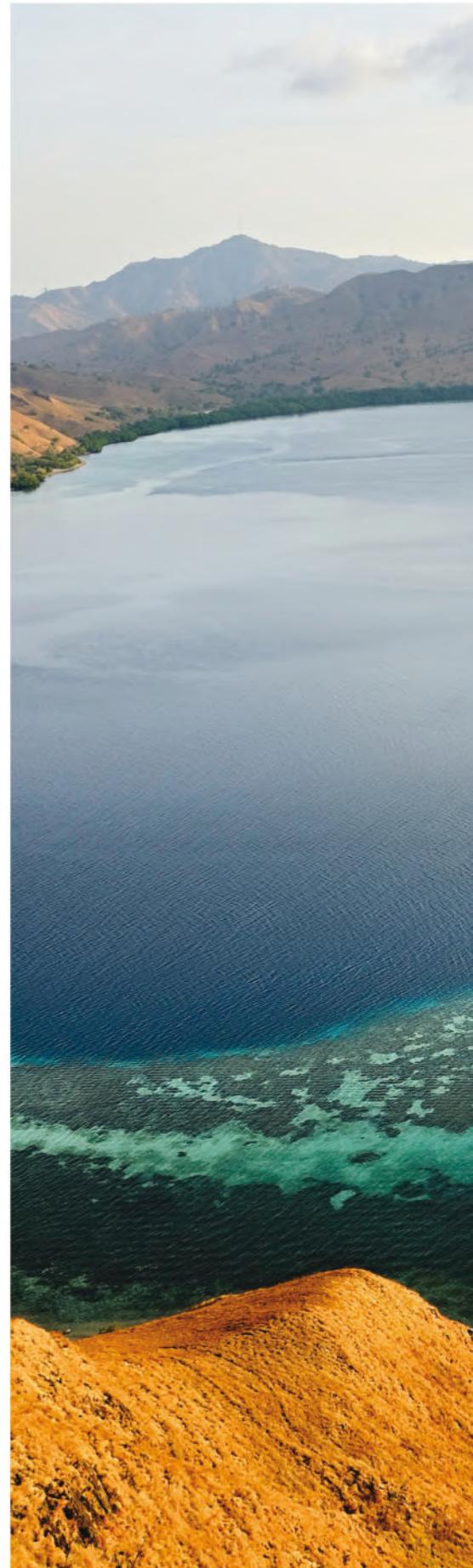
"It's not the pretty corals we've been seeing all week," Morgan-Grenville admits, referring to sites like Crystal Rock, where every inch of coral is alive, supporting anthias and schools of rainbow runners so thick they obscure any divers among them in the water column.

But muck diving is one of the main attractions of Indonesia. The only possible reason to skip it is a cold Bintang beer — unlimited for guests. But the stocked fridge will wait, so I opt in.

We start by hunting stargazers. Earlier, guide Gede Merta had shown pictures: The fish buries itself in the muck. Only its face — bug eyes and a frowning underbite of corn-kernel teeth — is visible.

I find nothing but broken coral

**Experiencing Komodo National Park via liveaboard includes topside exploration of the pristine island Gili Lawa Darat.**





bits until he shakes his dive light, commandeering our attention. Then he aims a wire pointer at the black sand.

The alien is no bigger than a baseball. It's a lesson repeated when Merta points out a bobtail squid, no bigger than a bumblebee. I think it's a juvenile till later that night, when we gather in the salon to pore over the *Reef Creatures* book.

Turns out, bobtail squid are no bigger than golf balls, making their sparkling iridescence somehow more magical.

And so the next few days and nights pass, muck diving at sites such as Fuzzy Bottom off Sumbawa Island. We're treated to encounters with algae octopuses, dragon sea moths, spiny devilfish and Bobbitt worms — all of which we truly only appreciate when Merta shows us those pages. And he would know. On the book's credit page, Merta is listed among eight dive guides whom authors Paul Humann and Ned DeLoach thank for helping them locate the critters. One thing not mentioned in the book: Merta has even discovered a few species.

### PRAYING FOR GREATNESS

It's the last day of the dive trip, and Merta and Morgan-Grenville can't seem to agree. We're at Gili Tepekong, an island off the southeast coast of Bali — and just hours from where the yacht will harbor for the final night.

This area is known for mola mola, aka ocean sunfish, but the season for seeing them extends only from roughly June to October. Right now, it's April.

"It's too early — we don't have a prayer," Morgan-Grenville tells us, not wanting to get our hopes up.

"They're there," says Merta.

And now, at 78 feet under the surface, Morgan-Grenville is gesturing wildly with his free hand, flashing a thumb up, while gripping his camera with the other.

We all fin deeper, and there, at 100 feet, is a mola mola, glowing white as the moon. Its apple-size eye follows us, its tiny mouth pursed in a pucker.

As I stare at it, and it stares back, I have to laugh. In a way, I'm not surprised. This is Bali, the land of a thousand temples and a population dedicated to its gods. With so much devotion, it'd be wrong not to expect at least a few miracles.

**Clockwise from top left:** Manta rays, false anemonefish, soft corals and nudibranchs await divers in Indonesia.





## FIVE REASONS TO CHOOSE KOMODO DANCER

**01**

### TENDER DIVING

All sites are accessed by tenders, facilitating drift diving and access to offshore pinnacles.

Dancer moors off its namesake island, visiting these killers is as easy as a dinghy ride.

**02**

### LOCAL FLAVOR

The lunch buffet is a highlight, when the chef prepares spiced fish cakes, vegetable curries, beef satays, banana fritters and more.

**04**  
**DAY EXCURSIONS**  
Take time for optional land-based excursions, including a pink beach without a soul on it.

**03**

### KOMODO DRAGONS

During much of the trip, no other boats are in sight. When Komodo

**05**  
**STAY FOR UBUD**  
Add a day or two to explore Ubud in Bali's interior. You'll tour temples, including one of the most famous, the Sacred Monkey Forest Sanctuary, home to 600 macaques.

## NEED TO KNOW

**When to Go** M/V *Komodo Dancer* ([dancerfleet.com](http://dancerfleet.com)) devotes most of the year to seven- and 10-day treks between Bali and Labuan Bajo, on the west coast of Flores. In October and November, itineraries travel between Flores and Alor, giving guests the chance to dive with whales, plus muck critters like wonderpus, blue-ringed and starry-night octopuses.

**Dive Conditions** The southern region has greener waters with temperatures ranging from 72 to 77 degrees; it's where manta sightings are much more frequent. The northern region sees visibility of 100 feet or more, and water temperatures around 82 degrees are standard.

**Operator** The 124-foot *Komodo Dancer* accommodates 16 guests in eight staterooms: two owner suites, two cabins with full-size beds, and the rest with bunk beds.

**Price Tag** Rates start at \$2,700 for seven nights, double occupancy. Deluxe and master suites are also available. Nitrox upgrades cost \$100 for seven days, and \$150 for 10 days.

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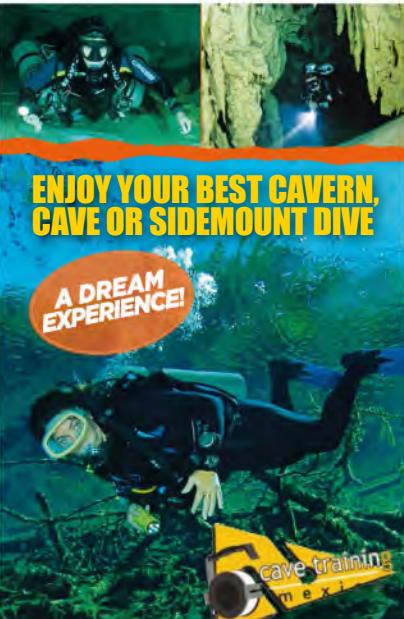


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# LOOK



**PHOTOGRAPHER** Cesare Naldi **LOCATION** Cenote El Pit, Quintana Roo, Mexico

**ABOUT THE SHOT** The sulfurous cloud, together with sunken trees and branches, creates a unique and mysterious atmosphere in which the subject seems to be diving into another dimension. To capture the image, I used a Nikon D300 camera and 12-24mm lens in a Sea&Sea housing, with two strobes. Fortunately, light travels better in fresh water, and I was able to light the entire scene with my strobes.

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